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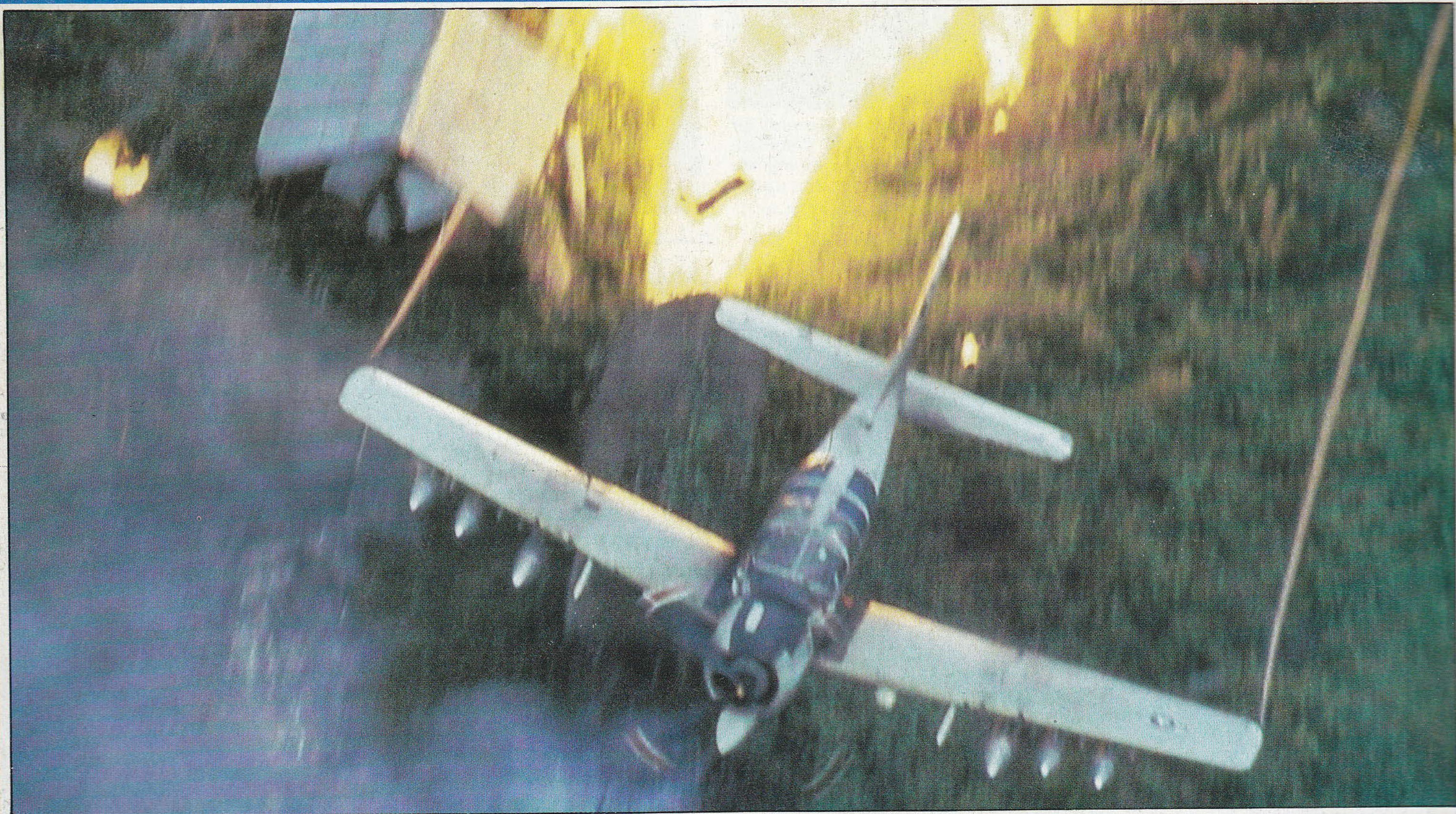

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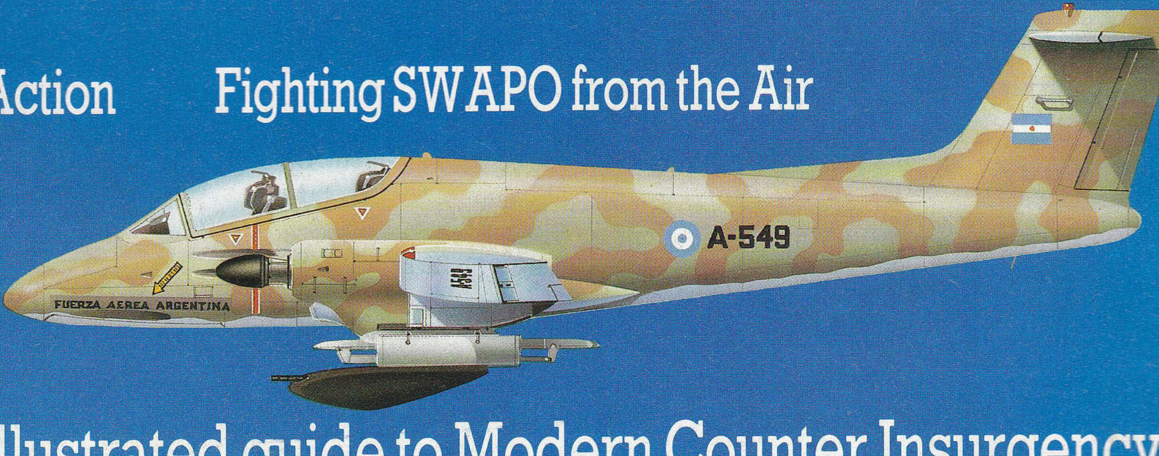

A fully illustrated guide to Modern Counter Insurgency Aircraft

WAR MACHINE

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Modern Counter Insurgency Aircraft

Such has been the pace of the evolution of modern weapon systems that the capabilities of modern front-line aircraft are far in excess of the needs of most of the world's nations. One does not need the technology of the Panavia Tornado to deal with poorly-armed insurgents, but aircraft can nevertheless be useful in limited conflict.

The ultimate counter-insurgency war saw the massive technology of the United States involved against Vietnamese Communists. Supposedly obsolete aircraft such as the Douglas Skyraider, designed during World War II, proved extremely effective in this role.

Whereas most military aircraft can be easily assigned to 'fighter', 'bomber', 'transport', 'trainer' or other clearly identifiable classifications, the COIN type is often more difficult to categorize. Indeed, it may be argued that aircraft were performing COIN operations well before the term gained currency (no pun intended) during the US involvement in Vietnam. COunter INsurgency (COIN) is a broad term, and as this assessment will demonstrate, a broad variety of aircraft has emerged to fulfil its requirements.

The insurgent comes in as many varieties as the aircraft assigned to thwart his aims but, essentially, he is a lightly-armed guerrilla fighter (or a regular soldier operating in a similar manner), often in a jungle or bush environment. Using natural cover to advantage, he can often evade the attentions of fast jet fighter-bombers, and with careful pre-planning can even survive saturation attacks by massed bomber fleets. Unlike the regular soldier, however, he is vulnerable to strikes of surgical accuracy performed by highly manoeuvrable aircraft, often directed by a forward controller on the ground or in the air. For as long as the insurgent lacks control of the air (and this is now changing with the wide availability of shoulder-fired SAMs) the slow-flying, lightly-armoured COIN aircraft is the defender's most valuable weapon.

It is of interest to note that of the 17 aircraft described below, only two were conceived for COIN missions (the FMA Pucará and Rockwell Bronco). The others are mainly trainers which have undergone varying degrees of conversion for their new role, be they just entering production or relics of the 1930s. Also represented are adaptations of a civilian twin tourer and a light transport. The advantages of this diversity, particularly to the less wealthy nations, are that most COIN aircraft may be regarded as 'reservists' which can undertake other duties until required for action.

US experience in Vietnam pointed out the need for an aircraft specifically to combat guerrillas and insurgents. Already ordered for the US Marines as an observation aircraft, the Rockwell OV-10 design was modified and the originally unarmed reconnaissance machine, later heavily armed, began to operate alongside the old Skyraiders.

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COIN Aircraft in Action

Since the start of organized conflict, struggles against government or king have taken the form of guerrilla warfare. Guerrillas, by their nature, choose terrain that hampers conventional land forces in their operations. The advent of air power, however, has added a new dimension to this age-old struggle.

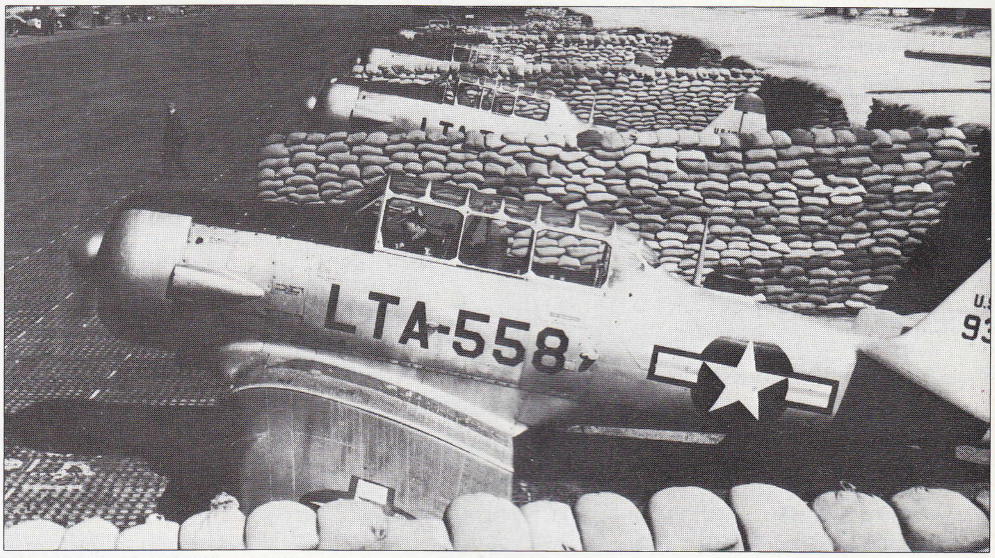
Although many firsts in aviation have been recorded for posterity, the invention (if that is the right word) of the COIN aircraft has eluded historians. This is not surprising, for the early military aeroplanes of World War I were employed in a broad spectrum of tasks, sometimes using light armament against opposing forces. Soon, however, aircraft were refined for specific operations such as air fighting or bombing, and it was the light bombers which carried the concept of what is now called COIN into the years between the world wars.

Peacetime tasks

Punitive raids to stop inter-tribal warfare in British and French colonies and mandated territories were an intermittent assignment of the peacetime air forces. When world war returned in 1939, it was largely a trial of regular forces using specialized aircraft of the most advanced types available, but there were exceptions. During the dark days of 1940, 1,500 sets of bomb racks were despatched to RAF flying schools in order that de Havilland Tiger Moth elementary trainers could help in repelling the anticipated German invasion. Ostensibly, the aircraft would have carried light bombs, but even 113-kg (500-lb) bombs were flown experimentally. (The parallel today would be a BAC Jet Provost armed with a tactical nuclear weapon.)

Still, this was not COIN in its strictest sense, because the immensity of the German thrust through Europe raised it well above the level of mere insurgency. Far closer to the COIN concept was a largely forgotten episode in Iraq during 1941 when supporters of a pro-Axis coup surrounded the RAF base at Habbaniyah with 9,000 troops and 30 artillery pieces. As the

North American T-6s tasked with forward air control rest in sandbagged revetments in Korea. Aerial observation is of crucial importance in guerrilla warfare; both the French in Algeria and the Americans in Vietnam made extensive use of airborne command posts.



Below: The Douglas A-1 Skyraider was designed as a carrier-based dive bomber by Ed Heinemann, who sought to produce an aircraft which could carry a truly impressive payload for its size. He more than achieved his aim, and the 'Spad' performed excellently over Vietnam.

A USAF OV-10A Bronco fires a salvo of rockets towards Viet Cong positions in the Mekong Delta. Some air force Broncos were fitted with Loran precision navigation and laser target illuminators for guiding 'smart' weapons launched by friendly aircraft.

home of No. 4 Flying Training School, the base could only field Airspeed Oxfords and Hawker Audaxes, but these were hastily armed with bomb racks and mounted a spirited defence for four days until the rebels withdrew.

It was two more decades before the term COIN came into general use, yet an evolutionary pattern had already been established. The COIN aircraft would in all probability be a trainer, perhaps fitted as standard with a single machine-gun or racks for practice bombs but which could easily carry a more potent load. At first, such aircraft were sent to war because nothing else was on hand; not until later were they seen as a weapon in their own right. Thus, during the late 1940s, the local wars which embroiled the Dutch in Indonesia, the French in Indo-China and the British in Malaya were largely fought by front-line aircraft.

The Korean War

Begun in 1950, the Korean War was similar. One of the Allied heroes, however, was the North American T-6 Texan, several of which were in service from the outset, acting as forward air controllers (FAC). Operating from airstrips close to the front line on their 'Mosquito' missions, T-6Fs (later replaced by purpose-converted LT-6Gs) performed valuable work in co-ordinating air strikes and undertaking battlefield surveillance. A former trainer was at last demonstrating its viability as a front-line weapon, and in the Algerian war which followed COIN was to win its spurs.

The Algerian rebellion against French rule began in November 1954 and from the beginning was a bitter campaign. Employing guerrilla tactics and their knowledge of the land, the ALN rebels were able to mount rapid attacks on French forces and civilians, then melt back into the terrain. After an early lack of success against the ALN, France rethought the tactical position and opted for a decentralized command structure of several air groups working in close collaboration with the army units in their area. This would allow the rapid response needed to combat a mobile and elusive foe.

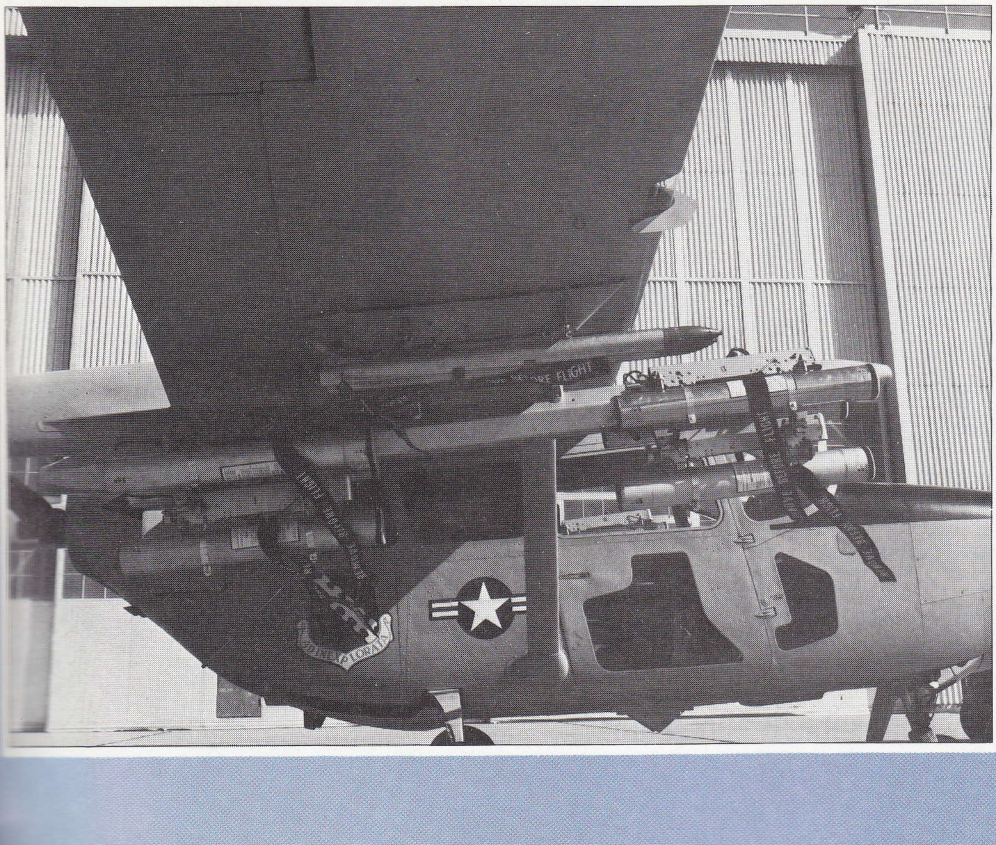
The Morane-Saulnier MS.733 Alcyon basic trainer was an early arrival in Algeria, often armed with rockets of various sizes, as was the SIPA S.12. Inevitably, the T-6 Texan made an appearance and was soon to dominate the COIN scene in the theatre, serving in numerous small, mobile squadrons. Typically, it would carry four podded 7.5-mm (0.295-in) machine-guns and six 50-kg (110-lb) bombs, or four 68-mm (2.68-in) and six T10 rockets. Other indigenous types serving in smaller numbers included the Max Holste MH.1521 Broussard (also with Army Aviation) and even Dassault MD.311 Flamant twins armed with up to six rockets.

In spite of its manoeuvrability and strength, the T-6 was becoming outdated by the late 1950s, especially as it was slow and thus vulnerable to ground fire. Two excellent replacements were obtained before the conflict ended in 1962, comprising 147 North American T-28 Fennecs and 113 Douglas AD-4 Skyraiders, each well-equipped with underwing pylons. France also made widespread use of helicopters for rapid transport of troops and supplies, even arming some of its Sikorsky H-19s and H-34s for 'gunship'-type operations. Algeria was truly the first 'COIN war' and should be considered a qualified success for the COIN concept, even though France capitulated on the political front after having won most of the rounds in the shooting battle.

Congo rebellion

Withdrawal from French service did not mark the end of the Texan's operational career. In July 1960, the Congo Republic's army revolted against its officers, placing the lives of locally resident Europeans in grave danger. Only the T-6s and Fouga Magisters of the Belgian air force flying school at Kamina were immediately available and, armed with machine-guns and rockets, they were largely effective in holding back the rebels until the Europeans could be rescued and a United Nations force flown in.

Deepening US involvement in Vietnam during the years immediately following were accompanied by increasing interest in the COIN concept. One of the most significant results was the commissioning of COIN aircraft on the drawing board, notably the North Amer-



The Cessna 337 was adopted for forward air control by the US Air Force in 1966 as the O-2A and despatched to Vietnam immediately. Many years later, in the hands of the Nicaraguans, they became notorious for rocketing residential areas during the dying weeks of the Somoza regime.

ican/Rockwell OV-10 Bronco twin turboprop. This, the winner of the Light Armed Reconnaissance Airplane (LARA) competition, began to enter service with the USAF and US Marine Corps in 1967. At first flown unarmed in Vietnam, it soon added guns and rockets for self protection.

At about the same time, Cessna was developing its T-37 basic jet trainer into the A-37 Dragonfly, the first examples of which were deployed to Vietnam for operational evaluation in 1967. The same firm's O-2 Super Skymaster piston twin was assigned to FAC and psychological warfare in this theatre after minimal conversion from a civilian passenger aircraft. Although it marked the Douglas Skyraider's swansong, Vietnam was more notable for the evolution of helicopters to meet army mobility and defence-suppression requirements and of transports as heavily armed gunships, specifically the Douglas AC-47 and Lockheed AC-130. Increasingly, however, the Vietnam War involved supersonic jets and heavy bombers whose use overshadowed the COIN-type missions regularly flown against the Communist guerrillas.

African problems

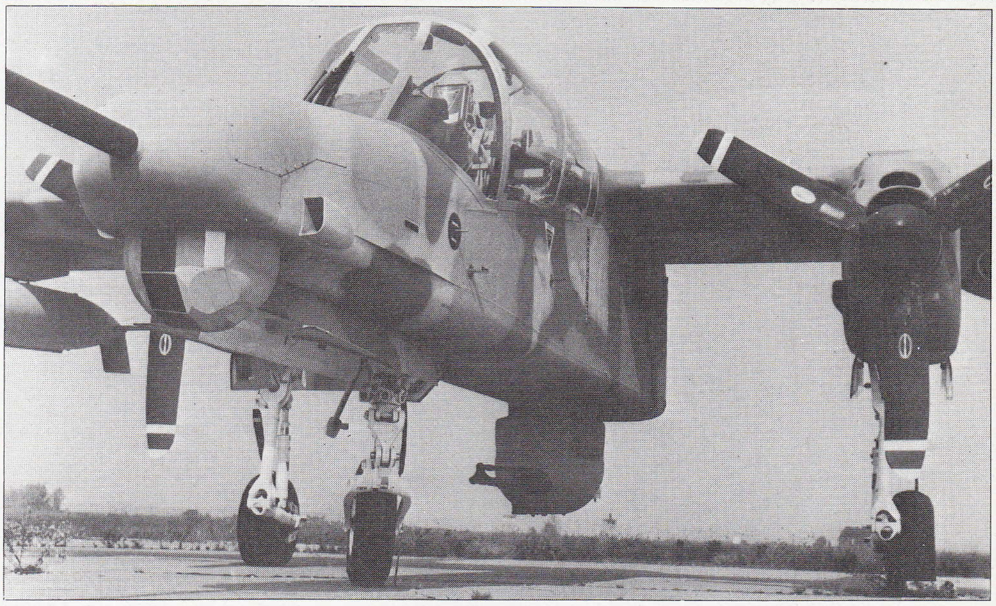
Africa presented a different picture as Portugal attempted to hold on to its colonies and the UK tried to return one to majority rule in the face of local white opposition. In Angola and Guinea-Bissau the ubiquitous T-6, wearing Portuguese colours, was much to the fore in attacking guerrilla positions, supported by more modern front-line aircraft, but conflicts begun in the early 1960s ended abruptly with a revolution at home in April 1974. Conversely, Rhodesia proclaimed an illegal administration in 1965, against which guerrillas operating from neighbouring black countries became increasingly active in the 1970s. Until the 1979 ceasefire which preceded the change to majority rule in what is now known as Zimbabwe, the Rhodesian Air Force operated against insurgents with armed SIAI-Marchetti SF.260W Warriors and Reims-Cessna FTB337 Miliroles, employing ageing Hunting Provosts for FAC.

One combat in this theatre worthy of note took place in August 1979 when three Rhodesian helicopters carrying a raiding party into Botswana were intercepted by a Britten-Norman Defender of the Botswana Defence Force. The Defender, unusual in that it is a COIN version of a light transport, was unable to destroy its opponents, however. A further low-key war involving British aircraft was that fought by Oman against South Yemeni-backed insurgents during the late 1960s and early 1970s, when Omani BAe (BAC) Strikemasters undertook operations against the Dhofar Liberation Front guerrillas and their suppliers.

Small confrontations such as these are commonplace throughout the world, yet seldom make the headlines. In the Philippines, SF.260 Warriors and T-28D Trojans are employed in anti-guerrilla operations; Burmese SF.260s, assisted by Pilatus PC-7 Turbo Trainers, attempt to suppress drug-growing and smuggling organizations; Salvadorean A-37Bs watch for infiltration from Nicaragua, and Cessna O-2As (amongst other types) are flown from Salvador by Nicaraguan expatriates on clandestine missions; Thailand has a varied and large COIN fleet including 15 A-37Bs, 40 T-28D Trojans, 25 OV-10 Broncos and 20 Fairchild AU-23A Peacemakers to guard against increasingly common incursions by Vietnamese troops pursuing Kampuchean guerrillas across the border; and Dassault-Breguet/Dornier Alpha Jets and OV-10 Broncos are some of the types used by Morocco in its battles with Polisario guerrillas in the disputed Western Sahara. The Alpha Jet is typical of today's trends in COIN, where trainers of all types have a secondary attack role and even microlights are being adapted to fire rockets.

Effective though the COIN aircraft can be in the optimum environment, it is dangerously vulnerable when met by a well-equipped opponent. Argentina's purpose-built FMA Pucará was the cause of considerable apprehension to British troops preparing to retake the Falkland Islands in 1982 but, in the event, had little impact on the battle. Many of the 25 Pucarás based on the Falklands were neutralized by pre-emptive air attacks and commando raids, or otherwise shot-down by shoulder-launched SAMs and BAe Sea Harrier fighters; those which remained proved more of a nuisance than a potent weapon. Perhaps the most important fact for the COIN aircrew to bear in mind is that one cannot be too careful in the choice of one's enemies.

The latest variant of the highly successful Rockwell OV-10 Bronco is the OV-10D night observation surveillance aircraft. This was ordered after extensive testing including evaluation under combat conditions in the I Corps tactical zone, South Vietnam, in 1971.



Below: Cheap but effective, the Aermacchi M.B. 326K carries up to 1814 kg (4,000 lb) of ordnance and two 30-mm cannon, making it an attractive proposition to a cost-conscious air force. South Africa manufactures its own version, the Impala, which has seen increasing action over Namibia in recent years.

USA

Beech T-34

Derived from the Bonanza tourer as a primary and basic trainer, the original **Beech 45 Mentor** undertook its maiden flight on 2 December 1948, employing the 168-kW (225-hp) Continental O-470 piston engine. Selected as the standard US military trainer, it was produced in quantity as the **T-34A** for the USAF (350) and **T-34B** in naval guise (423), overseas licences being granted for manufacture of a further 160 military variants in Japan by Fuji; 125 in Canada (100 to the USAF) by CCF; and 75 in Argentina by FMA, in addition to Beech exports. As late as 1982, 12 T-34Bs were refurbished and fitted with 213-kW (285-hp) Continental IO-520s for the Dominican Republic air force.

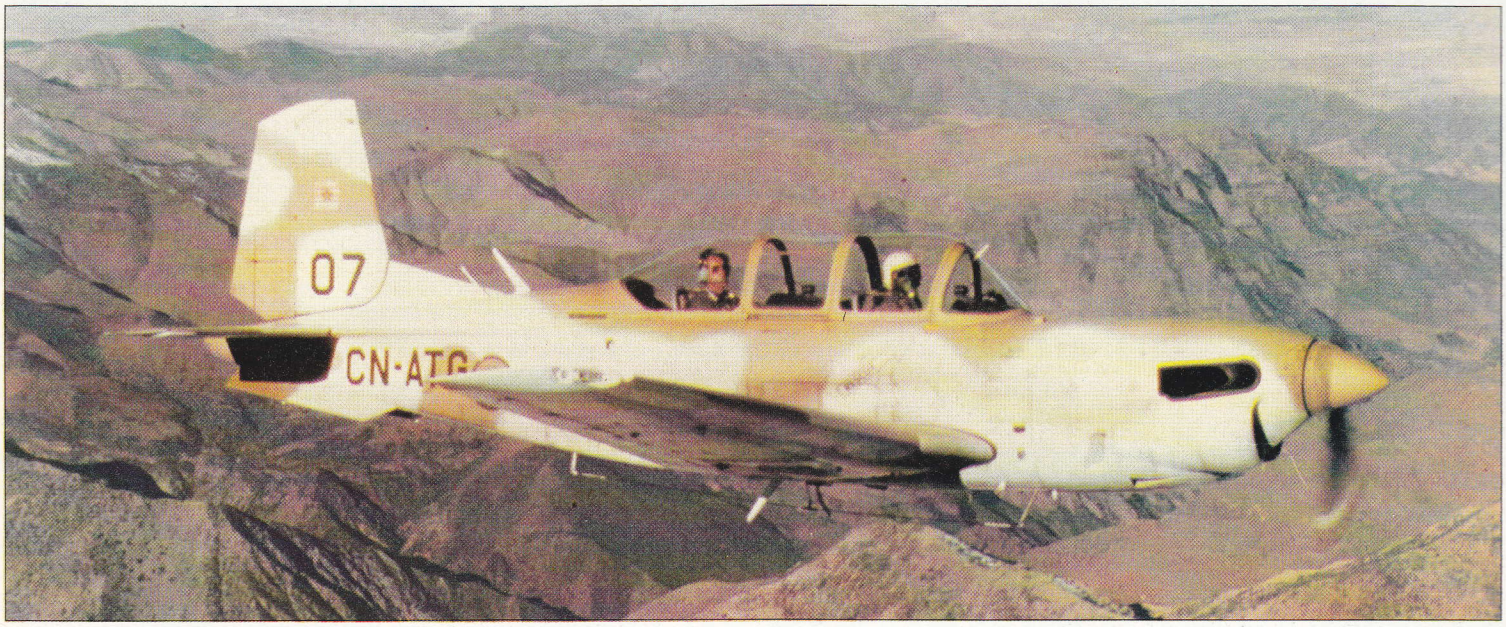
When the US Navy required a replacement, Beech offered a turboprop version of the design fitted with modern avionics to conform with current training aircraft standards. The powerplant selected was the popular Pratt & Whitney Canada PT6A which has been adopted by many similar trainers. Designated **YT-34C**, the prototype flew on 21 September 1973, a mere six months after the start of design work. Service-entry of the **T-34C** began in November 1977, and production continues against orders for 338 and an eventual requirement for around 450.

For greater appeal to the export market, Beech produced the **T-34C-1** with provision for underwing hardpoints and a reflector weapon sight, and capable of being used for armament training or combat COIN missions, together with forward air control. First deliveries were made to Morocco of 12, late in 1977, although they appear not to have been used in the Western Sahara operations against Polisario guerrillas. Further deliveries have comprised 23 to Ecuador (three for the navy), six to the Peruvian navy, 15 to the Argentine navy, 25 to Indonesia, three to the Uruguayan navy, four to the Gabonese presidential guard and 44 to Taiwan. Six supplied to Algeria in 1979 for pilot training are unarmed civilian-standard **Turbine Mentor 34C** aircraft.

Specification
Beech T-34C-1

Type: two-seat armed trainer
Powerplant: one 410-kW (550-shp) Pratt & Whitney Canada PT6A-25 turboprop derated from 533 kW (715 shp)
Performance: maximum speed 382 km/h (237 mph); initial climb rate 436 m (1,430 ft) per minute; service ceiling 9145+ m (30,000+ ft); combat radius 555 km (345 miles)
Weights: empty 1356 kg (2,990 lb); maximum take-off 2494 kg (5,500 lb)
Dimensions: span 10.16 m (33 ft 3.875 in); length 8.75 m (28 ft 8.5 in); height 2.92 m (9 ft 7 in); wing area 16.69 m^2 (179.6 sq ft)
Armament: four underwing pylons for 7.62-mm (0.3-in) Minigun pods, rocket pods, light bombs and flares up to a maximum weight of 544 kg (1,200 lb)

The Beech T-34C-1 has been sold to a number of air arms. This example, flown by the Moroccan air force, is typical in that provision has been made for underwing hardpoints.



USA

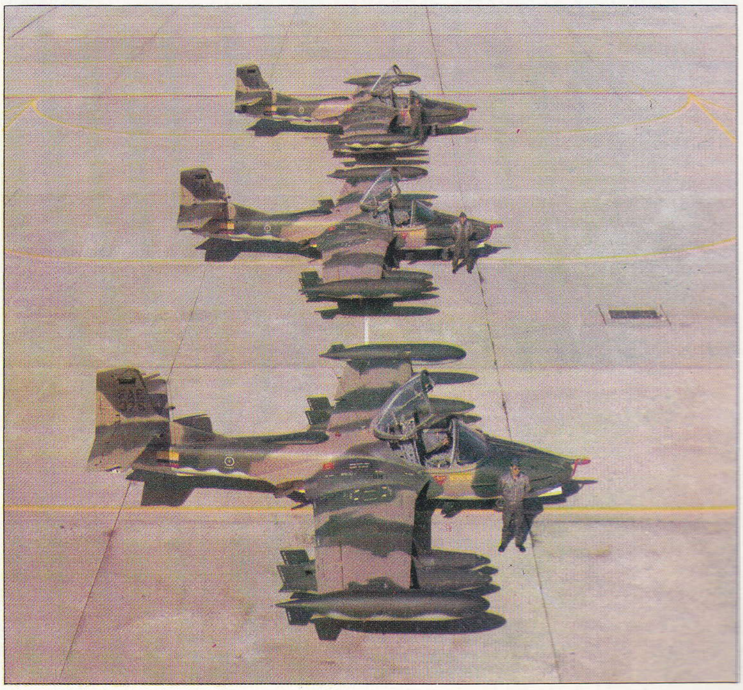
Cessna A-37 Dragonfly and T-37

When Cessna Aircraft flew the prototype **Cessna XT-37** on 12 October 1954, it was the first purpose-designed military jet basic trainer in the world apart from the Fouga Magister, and it was also the first use since 1918 of a foreign engine in a production US military type (the same engine as the Magister, installed in the same way in the wing roots). Unlike the French trainer the USAF adopted side-by-side seats, another startling departure from American practice. The **T-37A** entered service in 1957, and ever since has been the standard undergraduate pilot trainer. Following 534 T-37As came 447 **T-37B** aircraft with more power, revised instruments and better navaids. The urgent 1960s need for light attack aircraft was met by a modification of the armed **T-37C** export trainer. Via the **YAT-37D** came the very much more powerful **A-37 Dragonfly**, of which 39 **A-37A** machines began life as T-37Bs and 577 more were built as **A-37B** aircraft. Features include 6g airframe with full load, inflight-refuelling probe, and additional internal and external fuel. A-37s were active in Vietnam and exported to Chile, Ecuador, Guatemala, Thailand and South Vietnam.

Specification
Cessna A-37A

Type: light attack aircraft
Powerplant: two 1293-kg (2,850-lb) thrust General Electric J85-17A turbojets
Performance: maximum speed, clean 843 km/h (524 mph); range at high altitude with maximum payload (including 1860 kg/4,100 lb of ordnance) 740 km (460 miles)
Weights: empty 2817 kg (6,211 lb); maximum take-off 6350 kg (14,000 lb)
Dimensions: span (over tanks) 10.93 m (35 ft 10.5 in); length (excluding probe) 8.62 m (28 ft 3.25 in); height 2.8 m (9 ft 2 in); wing area 17.09 m^2 (183.9 sq ft)
Armament: one 7.62-mm (0.3-in) GAU-2B/A7 Minigun in nose, plus eight wing pylons (four inners 394 kg/870 lb each, next 272 kg/600 lb, outers 227 kg/500 lb) for dropped stores, cluster dispensers, pods, launchers or reconnaissance/EW gear

After being used successfully in Vietnam, the A-37 found favour with many countries whose major threats to stability came from within. In South America, nations such as Ecuador fly A-37s on internal security duties.



USA

Cessna O-2

The unusually-configured 'push-pull' **Cessna 336 Skymaster** flew on 28 February 1961 and was delivered to civilian operators from May 1963 onwards as a four/six-seat business aircraft. In February 1965, however, it was replaced on the production line by the **Model 337 Super Skymaster** which introduced, amongst other features, retractable landing gear.

In parallel, work proceeded on the **Model 337M**, which was assigned the US military designation **O-2A** when an initial batch of 145 was ordered in December 1966. Deliveries to the USAF eventually totalled 467 for replacement of the single-engine Cessna O-1 Bird Dog in the forward air control, target marking and attack coordination roles, notably in Vietnam. South East Asia was also the main operational theatre of 31 **O-2B** aircraft likewise ordered in December 1966 and rapidly produced by converting aircraft built for civilian sale. The O-2B was a psychological warfare aircraft, its main 'weapons' being a high-powered loudspeaker system and a leaflet dispenser. A few O-2As remain with the Air National Guard, their role being assumed by Cessna OA-37 Dragonflies, and four were supplied to El Salvador in 1982 as US aid for anti-guerrilla operations.

In France, Cessna licensee Reims Aviation produced an armed version of the Super Skymaster designated **Reims FTB337 Milirole** and supplied principally to Portugal and the illegal government of Rhodesia (now Zimbabwe). The latter received 18 with the local name of **Lynx**. Armed Super Skymasters remain in 'production' in the form of conversions of civil **T337s**, with two turbocharged 225-hp (168-kW) TSIO-360s, as the **Summit O2-337 Sentry**. Summit Aviation Inc. equips the Sentry with four underwing pylons, each able to carry 159 kg (350 lb) of weaponry or even a combined search radar and loudspeaker. Deliveries began to the Royal Thai navy in 1980 and have continued to Haiti, Nicaragua and Honduras. Many other air forces operate unarmed liaison versions of the Super Skymaster.

The unusual Cessna O-2 series, derived from the push-pull configured Skymaster, was the main light forward air control platform in Vietnam. By 1969, the USAF was using 'Psy War' O-2Bs fitted with powerful amplifiers and directional loudspeakers.

Specification

Cessna O-2 Super Skymaster
Type: COIN and FAC aircraft
Powerplant: two 210-hp (157-kW) Continental TSIO-360-A piston engines
Performance: maximum speed 320 km/h (199 mph) at sea level; initial climb rate 366 m (1,200 ft) per minute; service ceiling 5945 m (19,500 ft); range 1553 km (965 miles)
Weights: empty 1204 kg (2,655 lb); maximum take-off 1995 kg (4,400 lb)
Dimensions: span 11.58 m (38 ft 0 in); length 9.07 m (29 ft 9 in); height 3.06 m (10 ft 0.4 in); wing area 18.67 m^2 (201 sq ft)
Armament: 7.62-mm (0.3-in) Minigun pods, rocket pods, flares and other light ordnance on four underwing strongpoints

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USA

Lockheed T-33

Once the world's most widely-employed jet trainer, the **Lockheed T-33** was derived directly from another aircraft of note, the Lockheed F-80 Shooting Star, the USA's first mass-produced jet fighter. In fact, the aircraft was initially known as the **TF-80C** until assigned the more appropriate designation **T-33A** and universally nicknamed **'T-Bird'**. By August 1959, Lockheed had produced 5,691 of the type, including 699 for the US Navy, by which it was known as the **TV-2** (and **T-33B** from 1962 onwards). Also within this total were 1,058 supplied to friendly nations under MAP, these subsequently being augmented by numerous others retired from USAF service. Some of these were **RT-33A** tactical reconnaissance versions, with a camera nose and voice-recording equipment occupying the rear cockpit, from 85 of the type converted.

In Japan, Kawasaki built 210 T-33As under licence, whilst Canadair produced 636 **T-33A-N Silver Star** aircraft. The 50 or so of which remain in CAF service are now designated **CT-133**. Canadian-built T-Birds are non-standard in being powered by a 2268-kg (5,000-lb) thrust Rolls-Royce Nene 10 turbojet. Of 60 T-33A-Ns transferred to France, 52 were joined by 31 US-built aircraft in a modification programme undertaken by SFERMA, in which they were brought to a common standard as the **T-33SF**.

Fitted as standard with two machine-guns in the nose, the T-33A could be converted to **AT-33A** standard for COIN missions, carrying ordnance on underwing pylons. A handful of this model remains in front-line service (alongside some RT-33As) with the air arms of Burma, Uruguay and Mexico, the Burmese aircraft having seen operational use against guerrilla forces following their delivery in the late 1960s. Most remarkably, 14 Canadair CT-133s serving with the Bolivian air force at El Alto air base are solely responsible for the air defence of their country and have just been augmented by a further 18 supplied by France.

Specification

Lockheed AT-33A
Type: tandem-seat armed jet trainer
Powerplant: one 2449-kg (5,400-lb) thrust Allison J33-A-35 turbojet
Performance: maximum speed 966 km/h (600 mph); initial climb rate 1684 m (5,525 ft) per minute; range 909 km (565 miles)
Weights: empty 3666 kg (8,084 lb); maximum take-off 6551 kg (14,442 lb)
Dimensions: span 11.85 m (38 ft 10.5 in); length 11.51 m (37 ft 9 in); height 3.56 m (11 ft 8 in); wing area 22.02 m^2 (237 sq ft)
Armament: two nose-mounted 12.7-mm (0.5-in) machine-guns, plus various light bombs, rockets and machine-gun pods

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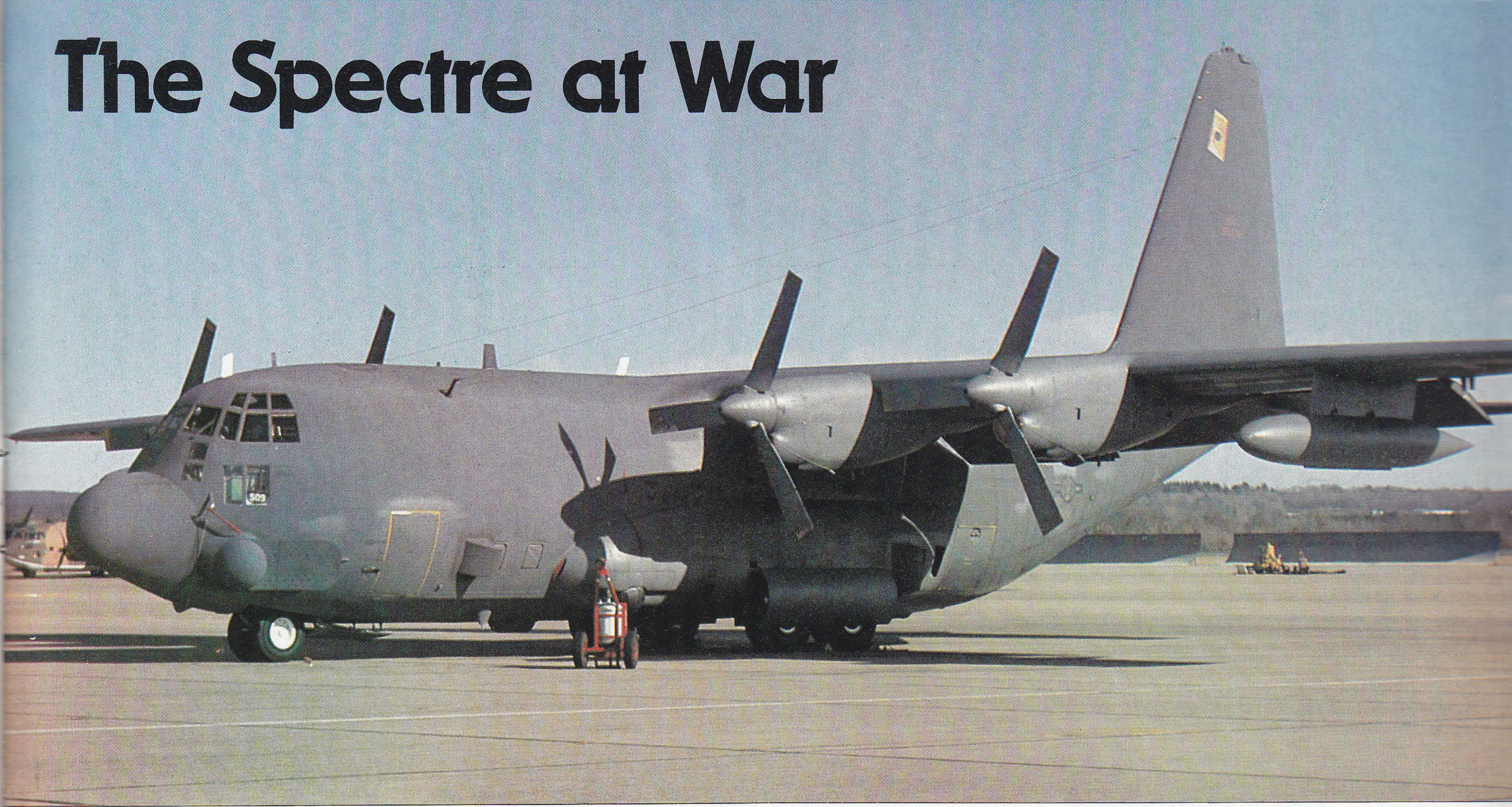
U.S. AIR FORCE

One of the most successful of all jet trainers, the T-33 started life as an adaptation of the World War II-designed P-80 jet fighter. It had a long USAF life, serving as a station hack into the 1980s, and still remains in front-line service with a number of air forces.

The Spectre at War



Operated by the 1st Special Operations Squadron at Hurlburt Field in Florida, this AC-130A is identifiable by its three-bladed propellers. This model does not carry the 105-mm howitzer.

One of the most effective weapons in Vietnam was also one of the most unforeseen – the conversion of transport aircraft into fearsome weapons directed against the guerrillas and their supply network.

Today's Lockheed AC-130H Spectre is painted gunmetal grey, packed with advanced target detection and acquisition systems, and armed to the teeth. Used by the US Air Force's 1st Special Operations Wing in the 25 October 1983 invasion of Grenada, the AC-130H is armed with nothing less than two 7.62-mm (0.3-in) Miniguns, two 20-mm cannon and one 105-mm (4.13-in) howitzer, the last being able to lob a 20-kg (44-lb) shell on to a target some 12000 m (13,125 yards) away. In Grenada, one AC-130H caught up in a continuing slugfest with Cuban gun emplacements was refuelled three times by a KC-10A tanker and carried out a combat sortie of some 16 hours' duration. But the Spectre's best-known successes, when it was still painted black, occurred in the counterinsurgency struggle in South East Asia. Before its arrival there, the hours of darkness belonged to the Viet Cong. Afterwards, the night belonged to the Spectre.

C-47 conversions

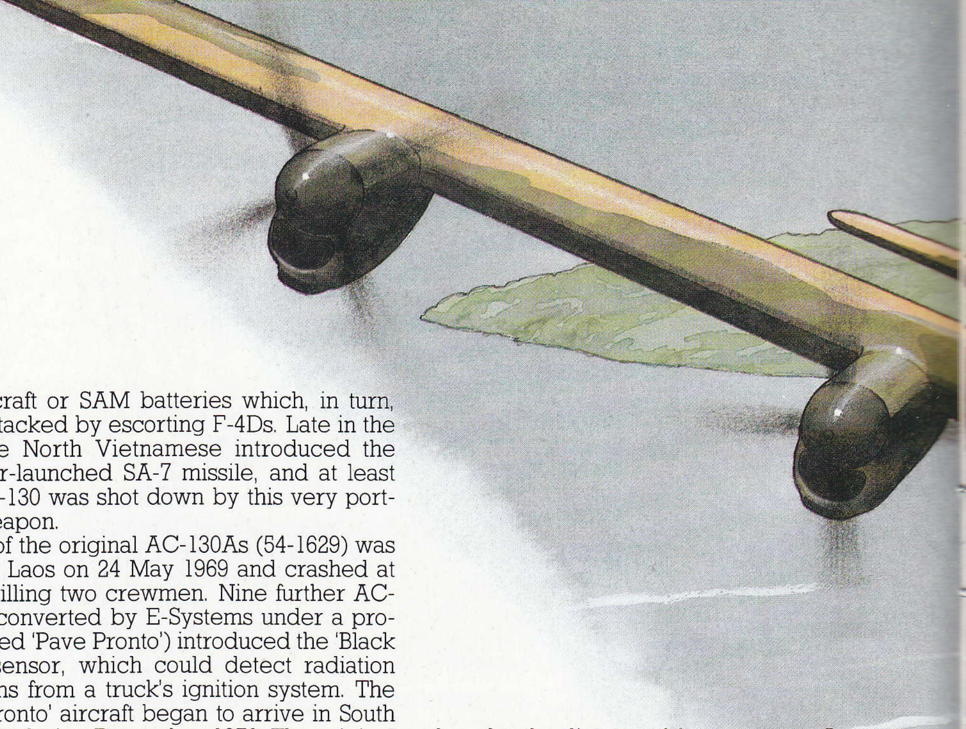
Gunship theory (flying an aeroplane in a pylon turn to aim side-mounted guns at a fixed position on the ground) had been known for years, but was not seriously tested until Vietnam. The gun-armed Douglas FC-47, later called the AC-47 Spooky, was remarkably successful in 'hosing down' Viet Cong insurgents making night attacks on US installations. Credit for converting the C-130 Hercules into a gunship seems to belong to a very junior AC-47 veteran, Captain Ronald W. Terry. The first YC-130 Hercules (53-3129) had made its maiden flight on 23 August 1954 at Burbank, California, with Stan Beltz as pilot-in-command, and more than 1,750 'Herk' cargo carriers have been produced over three decades for 39 nations. Building on AC-47 experience, Terry in 1965 won permission to modify one C-130A (54-1626) into a gunship.

At Wright-Patterson AFB, Ohio, Terry's C-130A (apparently never given the 'AC' prefix to signify the 'attack' role) was armed with four 7.62-mm General Electric MXU-470 Minigun modules and four 20-mm General Electric M61A1 Vulcan cannon. Because the guns, intended to fire sideways and down, would be ineffective without target acquisition, the C-130A was also equipped with a night observation device (NOD), or Starlight Scope, an infra-red sensor, a target-tracking computer, and a 20-kW searchlight. This equipment was crude as compared with that of the finished Spectre of later years, but the concept was proven in the crucible: Terry and his C-130A deployed to South East Asia. Flying from Nha Trang on 27 September 1967, Terry's C-130A blunted a Viet Cong assault on a firebase in South Vietnam. On 9 November 1967, the C-130A flew a successful night mission against the Ho Chi Minh Trail supply line in Laos, destroying a six-truck convoy.

Improved radar

Further successes against North Vietnamese truck columns led to a 1967 contract under which E-Systems, Inc. of Greenville, Texas, converted several airframes to AC-130A standard. These machines retained the same armament as Terry's prototype but introduced Texas Instruments' AN/AAD-4 forward-looking infra-red (FLIR) sensors, a new fire-control computer, and a moving target indicator (MTI) radar. The FLIR package enabled the crew to observe trucks and other targets on a monitor, in effect removing the benefit of darkness upon which the North Vietnamese supply effort de-

A Spectre opens fire on the trail. Vast numbers of trucks were claimed destroyed by the gunships, but their totals invariably exceeded the number of wrecks spotted at dawn by reconnaissance aircraft. Cynics invented a beast called the 'Great Laotian Truck Eater' to account for the disparity.



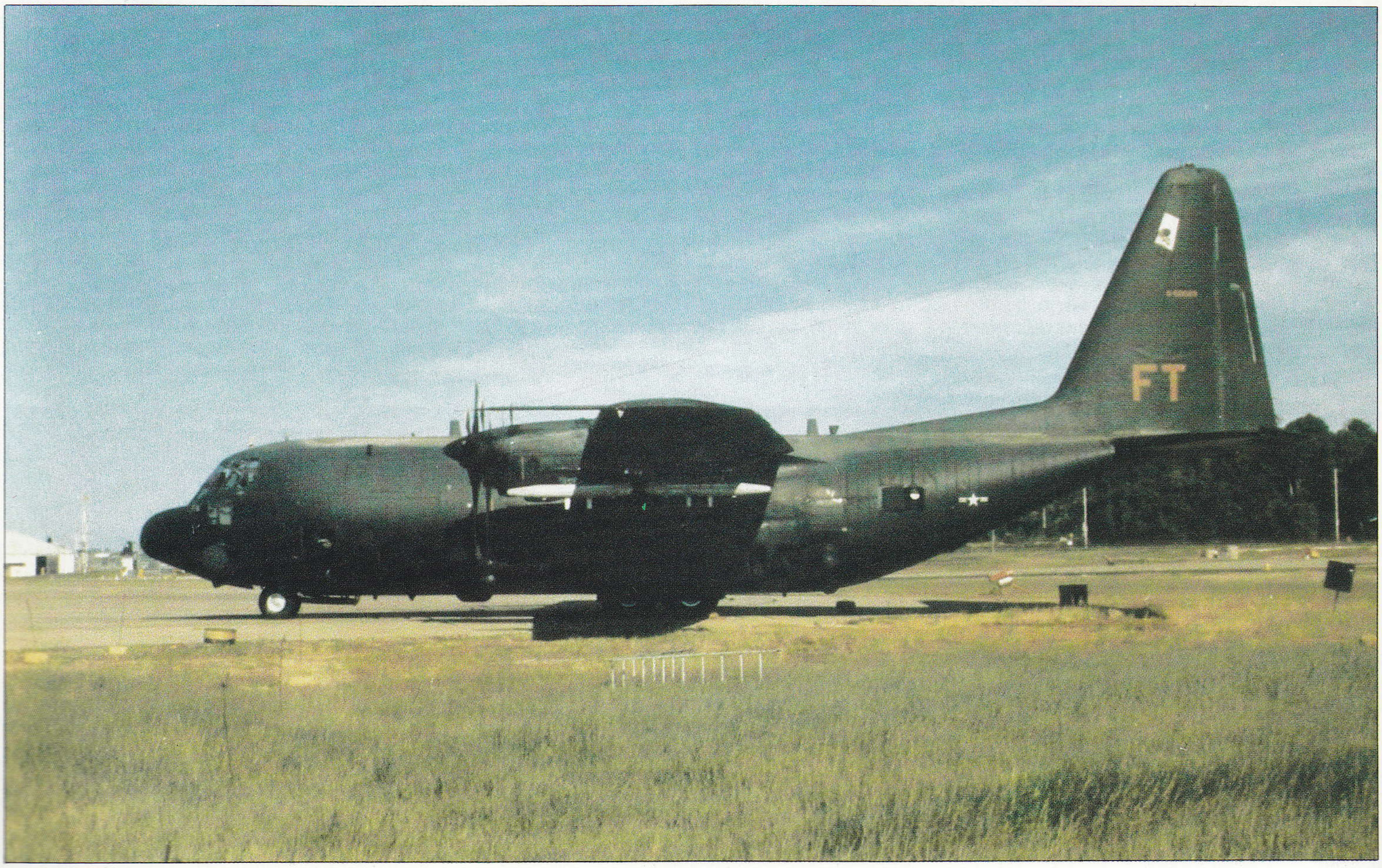
pended. While these machines went to war with the 16th Special Operations Squadron at Ubon, Thailand, in early 1969, an additional AC-130A went to Wright-Patterson for the next step in the continuing development of what was now nicknamed Spectre. Under Project 'Surprise Package', this AC-130A was modified with two 40-mm Bofors cannon in place of the aft pack of 20-mm guns. The Miniguns were deleted and new sensor systems were added, including the General Electric ASQ-145 Low Light Level Television (LLLTV), a further tool in acquiring and attacking targets under cover of darkness. FLIR and LLLTV literally turned darkness into day for AC-130A crews, while the target computer enabled Spectre to 'lock on' and maintain a fix on the moving enemy. The Spectre could orbit above North Vietnamese convoys and pour down a continuous barrage of firepower with devastating accuracy.

Hunter/killers

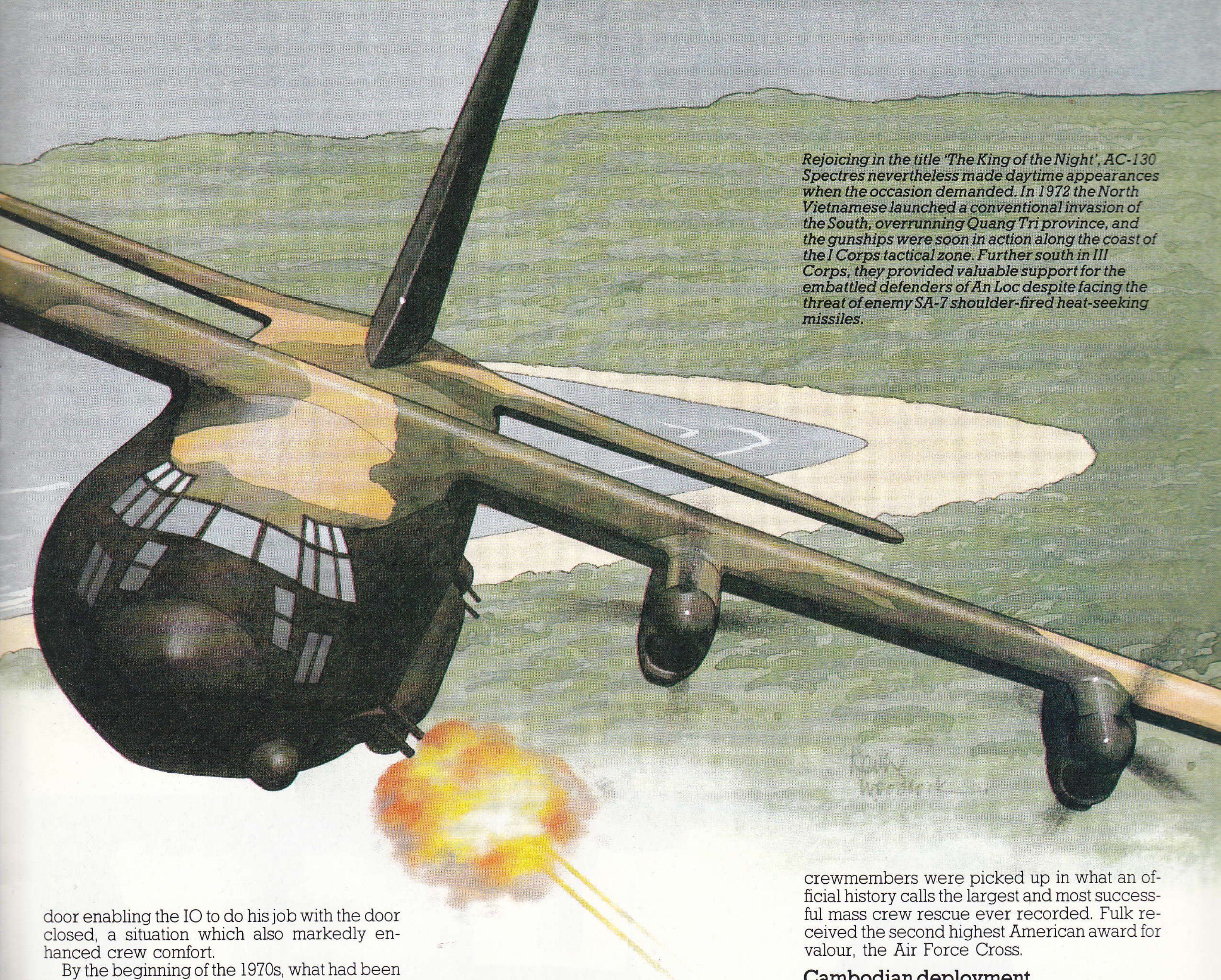
Among other tactics developed for the Spectre were those which combined the AC-130 and the McDonnell Douglas F-4D Phantom in a kind of hunter/killer team. The AC-130s used lasers to illuminate targets for F-4Ds carrying precision-guided munitions (PGMs), or 'smart' bombs. At times, AC-130s attacking North Vietnamese truck convoys would be engaged by anti-aircraft or SAM batteries which, in turn, were attacked by escorting F-4Ds. Late in the war, the North Vietnamese introduced the shoulder-launched SA-7 missile, and at least one AC-130 was shot down by this very portable weapon.

One of the original AC-130As (54-1629) was hit over Laos on 24 May 1969 and crashed at Ubon, killing two crewmen. Nine further AC-130As (converted by E-Systems under a project called 'Pave Pronto') introduced the 'Black Crow' sensor, which could detect radiation emissions from a truck's ignition system. The 'Pave Pronto' aircraft began to arrive in South East Asia during December 1970. The original batch of AC-130As, airframes fatigued by nightly missions into Laos and North Vietnam, were soon returned to the USA, but further development continued as 11 examples of a new model, the AC-130E, were introduced with greater capacity for fuel and ammunition. The AC-130E variant began combat operations from Ubon on 25 October 1971.

The pilot of an AC-130A Spectre may at times have felt a little like 'an occupant in a spam can', as one officer put it: his visibility, in large measure, was not as good as that of his sensor operator, and his skills as a pilot were partly slaved to the dictates of the computer. A target could, in fact, be assaulted without the pilot ever seeing it at all. But the crew member with the 'hairiest' job was the illuminator operator (IO). On the AC-130A, the IO lay exposed on the open rear loading ramp door, his head over the lip of the ramp, connected to the aircraft by a tether. Part of his job was to call out sightings of intense anti-aircraft fire or SAM missile launch to enable the pilot to take evasive action, knowing that an abrupt manoeuvre might, as it often did, send him hurling into space, dangling. On the improved AC-130E, a Plexiglas canopy was mounted over the cargo



Ubon Air Base in Thailand during the period between direct American involvement in the Vietnam fighting and the fall of Saigon in 1975. This AC-130A would have seen action over Cambodia and may well have been involved in the* Mayaguez *incident, also in 1975.



Rejoicing in the title 'The King of the Night', AC-130 Spectres nevertheless made daytime appearances when the occasion demanded. In 1972 the North Vietnamese launched a conventional invasion of the South, overrunning Quang Tri province, and the gunships were soon in action along the coast of the I Corps tactical zone. Further south in III Corps, they provided valuable support for the embattled defenders of An Loc despite facing the threat of enemy SA-7 shoulder-fired heat-seeking missiles.

door enabling the IO to do his job with the door closed, a situation which also markedly enhanced crew comfort.

By the beginning of the 1970s, what had been largely a war of insurgency grew to something more, a flood of war *matériel* from North to South Vietnam protected by increasingly formidable anti-aircraft and SAM networks, culminating in Hanoi's March 1972 all-out invasion. To improve the AC-130 Spectre's firepower, tests were conducted at Wright-Patterson with a variety of heavier weapons, including 57-mm and 106-mm (4.17-in) recoilless rifles. These tests led to the installation of the 105-mm howitzer, one of the largest weapons ever placed aboard any aircraft. The long-barrel howitzer was fitted with a flash suppressor and mounted on the port paratroop door in place of one of the 40-mm Bofors. On 31 March 1972, with the NVA invasion under way and AC-130s confronting Soviet-built tanks for the first time, the howitzer-equipped AC-130E was successfully introduced to combat.

Heroic action

The previous day, 30 March 1972, had seen one of the demonstrations of uncommon heroism which seemed almost commonplace for AC-130 crews. Over Laos, Captain Waylon O. Fulk and the crew of his AC-130E (69-6571) destroyed or damaged three enemy supply trucks and touched off four secondary fires and explosions. While attacking the third truck to make certain it was destroyed, Fulk's Spectre ran into a solid barrage of 57-mm and 37-mm anti-aircraft fire. One 57-mm round slammed into the starboard wing and another gouged open the right side of the fuselage. A leaking pylon fuel tank erupted in flames, wrapping the right wing in a shimmering fireball. The spray of burning fuel also set fire to the starboard side of the fuselage.

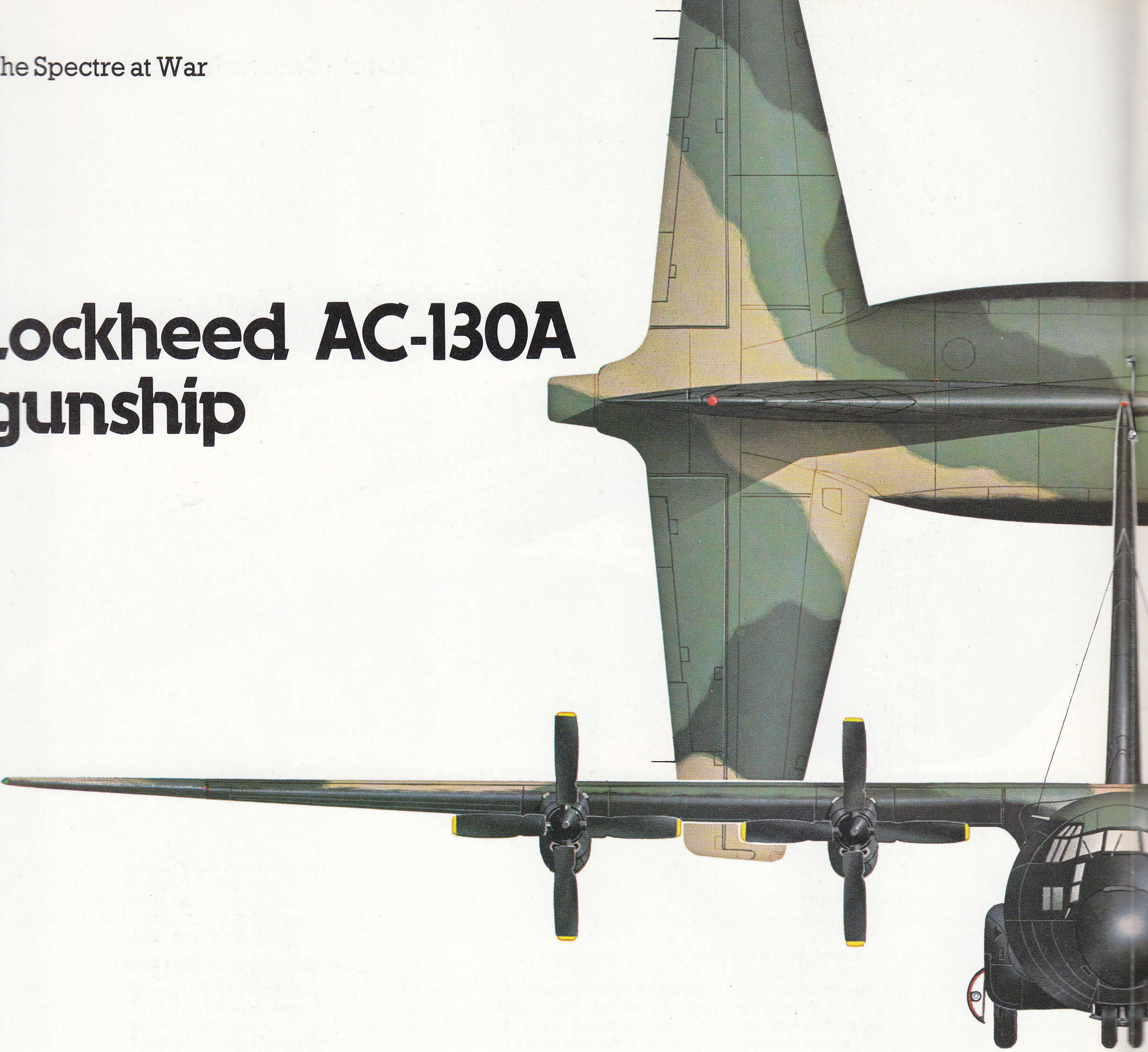
Fulk ordered all emergency measures to put out the fires. Seeing the seriousness of the situation, he directed the other 14 crew members to prepare for bale-out. Fulk steered the Spectre away from the intense anti-aircraft fire, while reporting the emergency to controlling radar stations and nearby aircraft. Another aircraft arrived and advised Fulk on the extent of the damage. Steadying the crippled AC-130E as best he could, the pilot called for the crew to bale out and radioed position information. Serving as jumpmaster, the IO informed Captain Fulk that 13 of the crew had 'hit the silk'. Fulk engaged the automatic pilot and placed the gunship in a slight turn to ensure a crash-landing heading away from friendly territory. He then joined the IO at the Spectre's rear cargo ramp. After checking parachute harnesses, both men jumped. Moments later, the fires and ammunition explosions turned the aircraft into a plummeting fireball. Next day, all 15 crewmembers were picked up in what an official history calls the largest and most successful mass crew rescue ever recorded. Fulk received the second highest American award for valour, the Air Force Cross.

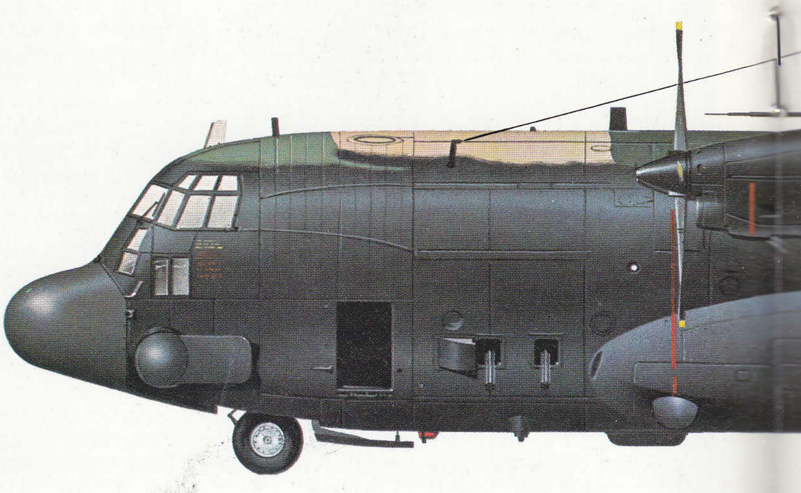
Cambodian deployment

Today's AC-130H Spectre is essentially a re-engined AC-130E. In 1973, the US Air Force began upgrading its entire C-130E fleet by replacing Allison T56-A-7 engines with T56-A-15s. While the gunship force was undergoing this modification, equipment aboard the fleet was standardized, updated avionics and a 105-mm howitzer being added to those airframes which lacked them. The AC-130H model began to arrive at Ubon in 1973, the original gloss-black Spectre paint scheme being replaced by flat black on some aircraft, gunmetal grey on others. Although the Vietnam conflict ended in January 1973, Spectre gunships remained active in Cambodia until August 1973 and were still active when Saigon was evacuated on 30 April 1975. When US forces moved to recover the crew of the merchant vessel *Mayaguez*, captured by Cambodian forces in May 1975, AC-130 Spectres sank several Cambodian navy ships.

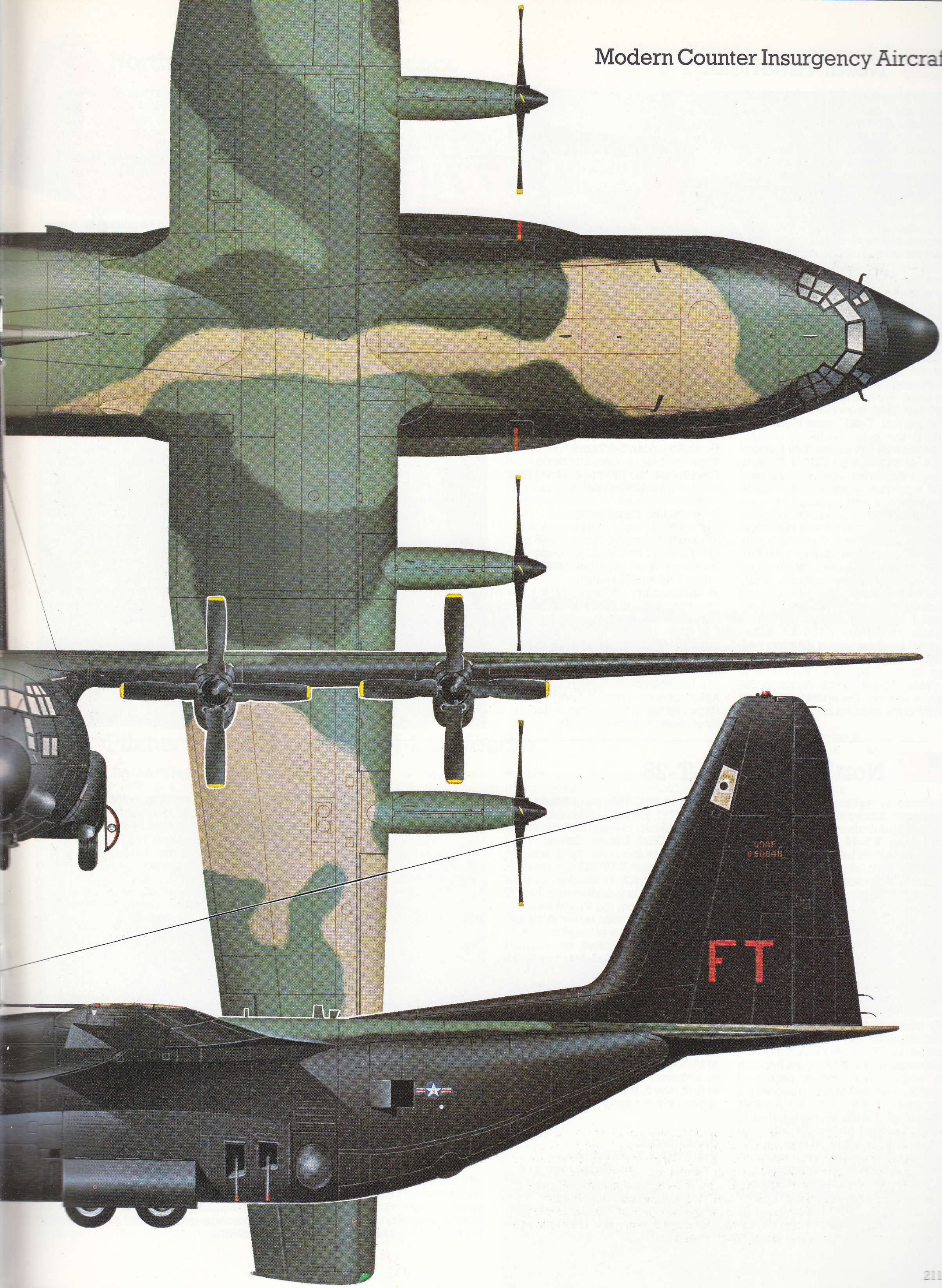
Inflight-refuelling capability was added to the AC-130H fleet in 1978. In April 1980, a pair of AC-130Hs were deployed to support the attempt to rescue US hostages in Iran but were not used. The AC-130 Spectre proved itself again in Grenada and remains, today, a formidable part of the US Air Force's capability for counterinsurgency and special operations.

Lockheed AC-130A gunship





This Lockheed AC-130 gunship was converted from a standard and elderly Lockheed C-130A-LM, serial number 55-0046 (the '0' prefix to the serial number indicates an aircraft over 10 years old). Early model gunships carried four 7.62-mm Miniguns and four 20-mm Vulcan cannon. Their sensors included night observation devices and forward-looking infra-red (FLIR) systems. Updated models mounted paired 7.62-mm, 20-mm and 40-mm cannon, FLIR, low-light television, a laser target designator, a radar tracking sensor and 'Black Crow', a system for detecting operating ignition systems on trucks. One version even sported a 105-mm howitzer.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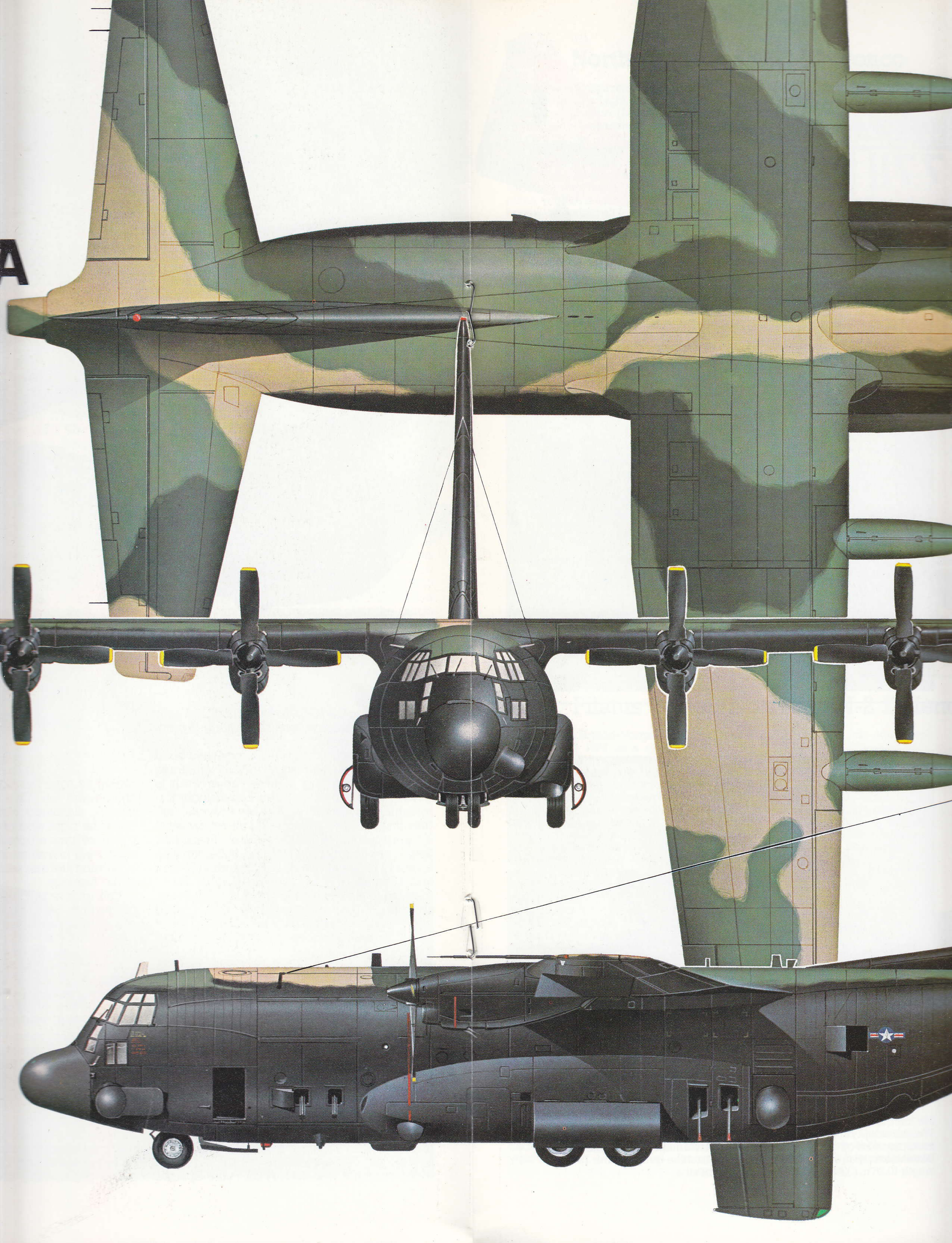
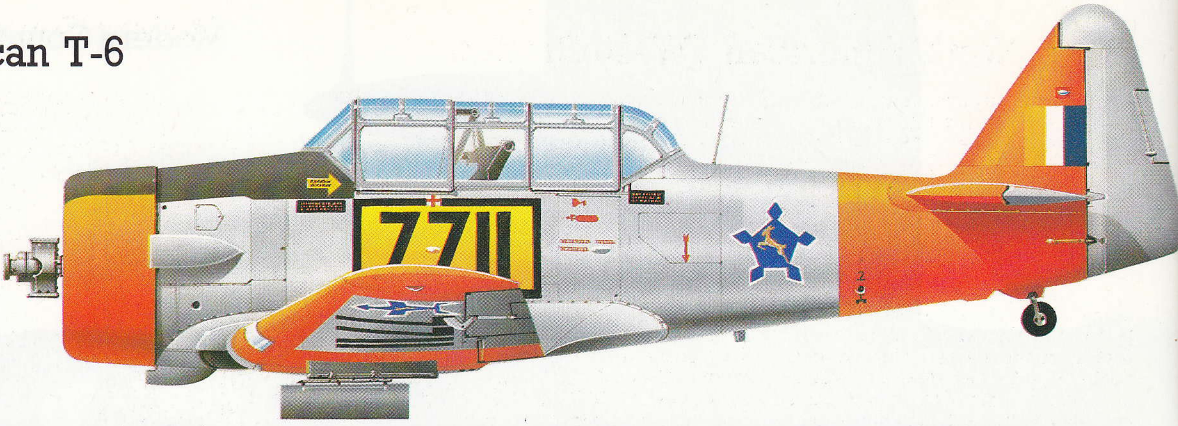


USA

North American T-6

Having flown in prototype form over 50 years ago, in April 1935, the **North American AT-6 Texan** remains in surprisingly large-scale use today, although it is more readily identified within the British Commonwealth by its RAF name **Harvard**. In 10 years, over 17,000 AT-6s of various subtypes were built by the parent firm, including the **SNJ** series for the US Navy, augmented by another 4,500 constructed under licence in four other countries. In 1948 a rationalization of designations resulted in the 'A' (Advanced) being deleted from the USAF nomenclature just as the aircraft was about to take on a fresh lease of life: there being no immediate successor in prospect, 2,068 aircraft were remanufactured with a raised instructor's seat, new cockpit layout, additional fuel capacity, propeller spinner, steerable tailwheel and P-51 Mustang-type landing gear and flap actuating levers. Produced between 1949 and 1953, the 'new' aircraft were designated **T-6G**, many going to NATO for pilot training duties, together with 285 similar **T-6J Harvard Mk 4** aircraft built by CCF in Canada. Early in the Korean War, lightly-armed **T-6F** machines were used for COIN-type missions until replaced by some of the 97 **LT-6G** conversions optimized for forward air control and battlefield surveillance. LT-6Gs were also supplied to France and Turkey. Like Portugal, France also used the T-6G for policing its overseas colonies, fitting underwing racks for bombs and machine-guns, whilst 120 of the 201 delivered to Spain received the official 'fighter' designation **C.6** for close-support missions armed with two 7.62-mm (0.3-in) guns in the wing and provision for 10 10-kg (22-lb) bombs or 12 rockets. Today, South Africa is the largest military T-6 operator with about 50 in the training role.



While no longer flying with the Active Citizen Force, as the SADF civilian reserve is called, South Africa has retained the T-6 Harvard in its training squadrons. Thus they reinforce the SADF's already-formidable COIN capability.

North American T-6 trainers were used in the attack role by the Armée de L'Air in Algeria. Armament includes two Browning MGs in the wings, as well as underwing rockets and light bombs.

Specification

North American T-6 Texan
Type: tandem-seat armed trainer
Powerplant: one 600-hp (447-kW) Pratt & Whitney R-1340-49 radial piston engine
Performance: maximum speed 338 km/h (210 mph); cruising speed 235 km/h (146 mph); climb to 3048 m (10,000 ft) in 7 minutes 24 seconds; service ceiling 7376 m (24,200 ft); range 1012 km (629 miles)
Weights: empty 1769 kg (3,900 lb); maximum take-off 2338 kg (5,155 lb)
Dimensions: span 12.81 m (42 ft 0.25 in); length 8.84 m (29 ft 0 in); height 3.57 m (11 ft 8.5 in); wing area 23.57 m^2 (253.7 sq ft)
Armament: one fixed forward-firing machine-gun or (T-6G) various loads of light ordnance on underwing pylons (typically two machine-gun pods and six rockets on individual rails)

USA

North American T-28

Produced to replace the manufacturer's highly successful T-6 Texan as a basic trainer, the prototype **North American XT-28** first flew on 26 September 1949, being one of the most powerful in its class and introducing the tricycle landing gear to this stage of the instructional syllabus. USAF contracts covered 1,194 **T-28A Trojan** aircraft, whilst the US Navy bought 489 **T-28B** and 299 arrester hook-equipped **T-28C** aircraft, the two last-mentioned models being powered by the 1063-kW (1,425-hp) Wright R-1820.

Production was completed in 1957, but between 1961 and 1969 North American converted 321 T-28As to **T-28D** standard, then passed to Fairchild-Republic the task of producing another 72. The T-28D was fitted with six strongpoints and two guns beneath the wings, the maximum permitted weapon load eventually reaching a very useful 1814 kg (4,000 lb). Another batch of 75 T-28As was converted to T-28D standard under US Navy auspices. T-28Ds were mainly for the MAP programme, and were assigned to South Vietnam (where they saw considerable action), Laos and elsewhere.

Currently, front-line service is seen by some 40 in Thailand and 30 in the Philippines, whilst non-operational T-28As serve in South Korea and Mexico. In Taiwan, 50 T-28As were fitted with a 1081-kW (1,450-shp) Lycoming T53-L-701 turboprop during 1976-81 as the **AIDC T-CH-1 Chung Hsieng** basic trainer. This followed USAF trials in 1963-4 of three **YAT-28E** conversions with the 1827-kW (2,450-shp) Lycoming T55 turboprop and no less than 12 wing strongpoints, the variant failing to achieve a production order. A further military conversion of surplus T-28As, the **PacAir T-28R Nomad**, was adopted by France as the **Sud-Aviation T-28S Fennec**. Sud produced 147 Fennecs between 1960 and 1962 for replacement of T-6Gs used in the COIN role in Algeria, and when withdrawn in the mid-1960s, 63 were sold to the Argentine navy (the 18 survivors being passed to Uruguay's navy in 1980-1) and 25 to Morocco (since retired). A US dealer acquired others, of which 10 were refurbished for Haiti in 1973, but apparently not used.

A North American T-28 in flight over the Canal Zone in the late 1960s. With a 1814-kg (4,000-lb) weapon load, the T-28 proved to be amongst the most capable of all the trainers converted to combat aircraft, and many still find use on the Thai/Cambodia border and in the Philippines.

Specification

Sud-Aviation T-28S Fennec
Type: COIN-optimized tandem-seat trainer
Powerplant: one 1007-kW (1,350-hp) Wright R-1820-56 radial piston engine
Performance: maximum speed 547 km/h (340 mph); cruising speed 349 km/h (217 mph)
Weights: empty 3000 kg (6,614 lb); maximum take-off 4250 kg (9,370 lb)
Dimensions: span 12.38 m (40 ft 7.5 in); length 10.26 m (33 ft 8 in); height 3.87 m (12 ft 8.5 in); wing area 24.90 m^2 (268 sq ft)
Armament: four 12.7-mm (0.5-in) machine-guns and four 135-kg (297-lb) bombs

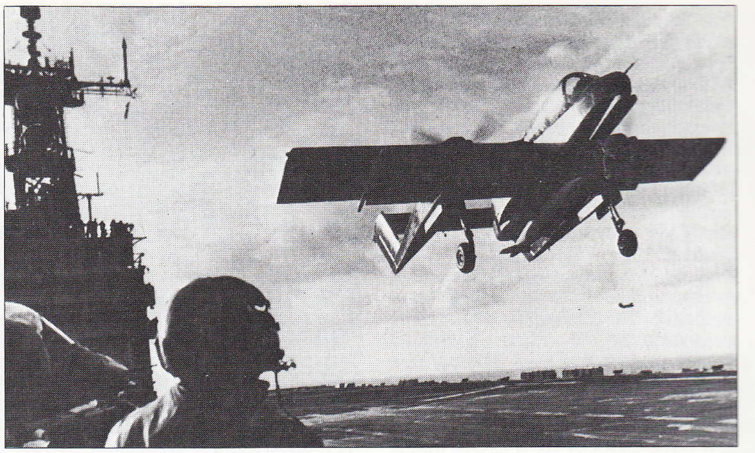
USA

North American OV-10 Bronco

A US Marine Corps requirement of the early 1960s for a Light Armed Reconnaissance Airplane (LARA) was met by the **North American NA-300** design submission, and a contract for seven **YOV-10A** prototypes was placed in 1964, the first of them flying on 16 July 1965. With a slender two-seat fuselage nacelle mounting a high-set monoplane wing, the aircraft had twin tail booms extending aft from the nacelles of the two turboprop engines, each with a fin and rudder, and interconnected by a tailplane/elevator assembly; the main units of the tricycle landing gear retracted into the engine nacelles. Six of the prototypes were powered by 447-kW (600-hp) Garrett T76-G-6/8 engines, but one had Pratt & Whitney YT74-CP-8/10 turboprops for comparative evaluation. The **OV-10A Bronco** production version had a 3.05-m (10-ft) increase in wing span and more powerful T76-G-10/12 engines, the first flown on 6 August 1967, and 114 were built for the US Marine Corps. These were followed by 157 similar OV-10As for the US Air Force, these entering operational service in Vietnam in 1968. Under the US 'Pave Nail' programme, 15 were provided with special equipment for the location and illumination of targets by night. Other versions have included six **OV-10B** aircraft supplied to Germany as target tugs, followed by 18 turbojet-boosted **OV-10B(Z)** aircraft for the same role. Versions similar to the OV-10A have been supplied to Indonesia (16), Thailand (40) and Venezuela (16), under the respective designations **OV-10F**, **OV-10C** and **OV-10E**, and six US OV-10As have been transferred to the Royal Moroccan air force. Two OV-10As were modified under a US Navy contract of 1970 to **YOV-10D NOGS** (Night Observation/Gunship System) aircraft to provide the US Marines with advanced night operational capability. Since evaluation of these aircraft, 17 US Marine Corps OV-10As have been converted to **OV-10D NOS** (Night Observation Surveillance) configuration, now equipped with FLIR (forward-looking infra-red) and a laser target illuminator.

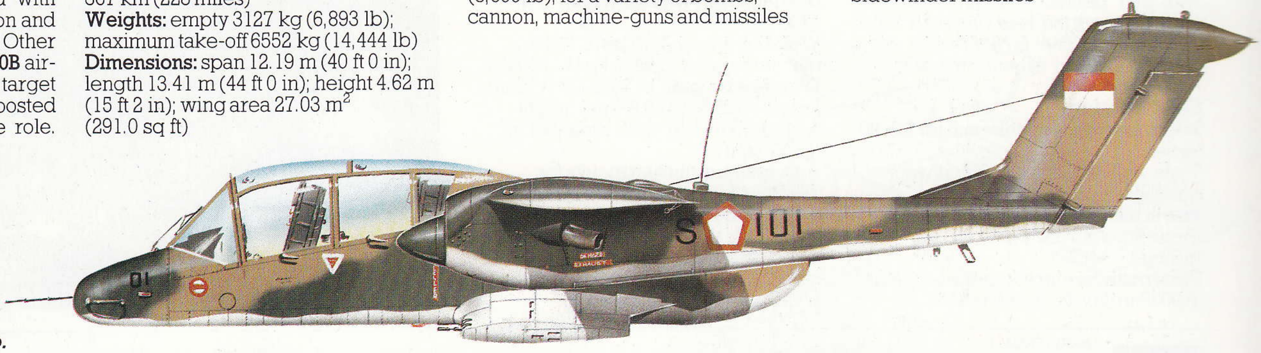
Specification

North American (Rockwell) OV-10D
Type: COIN and night surveillance aircraft
Powerplant: two 776-kW (1,040-shp) Garrett T76-G-420/421 turboprops
Performance: maximum speed 463 km/h (288 mph) at sea level; service ceiling 9145 m (30,000 ft); combat radius with full weapon load 367 km (228 miles)
Weights: empty 3127 kg (6,893 lb); maximum take-off 6552 kg (14,444 lb)
Dimensions: span 12.19 m (40 ft 0 in); length 13.41 m (44 ft 0 in); height 4.62 m (15 ft 2 in); wing area 27.03 m^2 (291.0 sq ft)



Taking full advantage of their STOL capability, OV-10s were able to operate from aircraft carriers during the Vietnam war. Two OV-10s were experimentally fitted with XM-197 20-mm Gatling guns. Operating from Da Nang, they were highly successful and the USMC ordered 114.

Armament: five fuselage/sponson weapon attachment points with combined capacity of 1633 kg (3,600 lb), for a variety of bombs, cannon, machine-guns and missiles plus two underwing pylons, each with a capacity of 272 kg (600 lb) and suitable for bombs, fuel tanks or Sidewinder missiles



Indonesia took delivery of 16 OV-10s to augment her counter-insurgency capability. Featuring excellent visibility, rough field landing gear and a respectable weapon fit, the Bronco can carry six paratroops, casualties or cargo.

UK

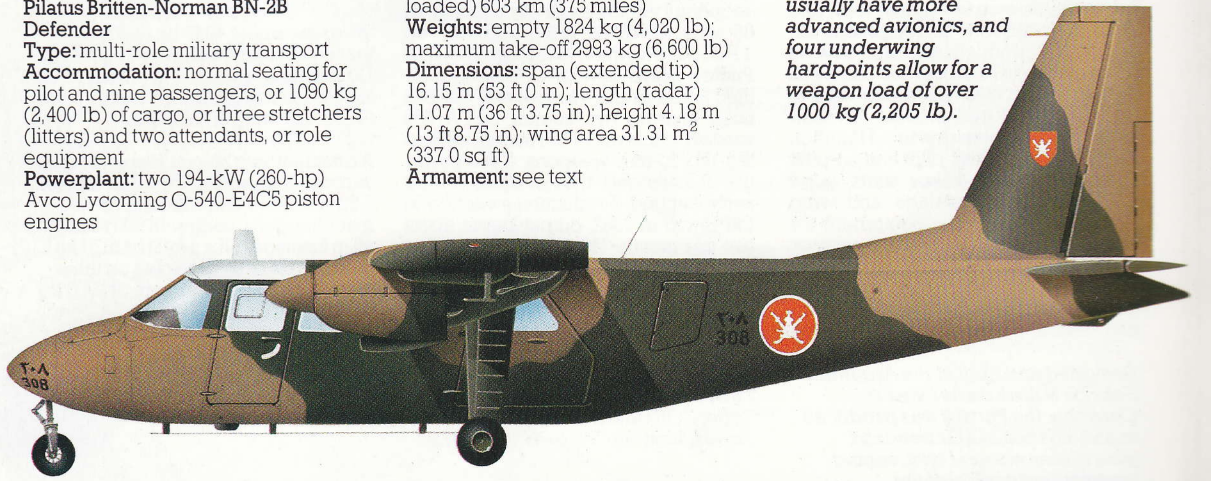
Pilatus Britten-Norman BN-2 Defender

The original Britten-Norman Islander flew in June 1965 as a simple light transport with five side-by-side seats and a door for each pair, thus eliminating the need for an aisle and enabling the fuselage to have smaller width and giving better performance on modest power. Deliveries began in 1967 and over 1,000 had been delivered by late 1984. Many have been sold to military customers, and in 1971 the manufacturer introduced the **Britten-Norman BN-2 Defender** multi-role military model offering many new options for numerous missions. The latter include SAR (search and rescue), internal security, long-range patrol, FAC (forward air control), troop transport, logistic support and casualty evacuation, in addition to such previous roles as survey, photo-reconnaissance, firefighting, spraying and paratroop training. Options include four NATO underwing pylons for twin 7.62-mm (0.3-in) machine-gun pods, 113- or 227-kg (250- or 500-lb) bombs, Matra rocket pods, Sura rocket clusters, wire-guided missiles, reconnaissance flares, markers, ECM pods or various drop tanks. Defenders had been sold to 21 countries by 1983. Most have the extended raked wingtips housing extra fuel, and many have nose radar. Radar is almost standard in the **Maritime Defender**, which is an offshore patrol aircraft with extremely comprehensive avionics and role equipment.

Specification

Pilatus Britten-Norman BN-2B Defender
Type: multi-role military transport
Accommodation: normal seating for pilot and nine passengers, or 1090 kg (2,400 lb) of cargo, or three stretchers (litters) and two attendants, or role equipment
Powerplant: two 194-kW (260-hp) Avco Lycoming O-540-E4C5 piston engines
Performance: cruising speed at 75 per cent power 264 km/h (164 mph); range with maximum payload (pylons loaded) 603 km (375 miles)
Weights: empty 1824 kg (4,020 lb); maximum take-off 2993 kg (6,600 lb)
Dimensions: span (extended tip) 16.15 m (53 ft 0 in); length (radar) 11.07 m (36 ft 3.75 in); height 4.18 m (13 ft 8.75 in); wing area 31.31 m^2 (337.0 sq ft)
Armament: see text

The Sultan of Oman's Air Force uses the Defender, which retains its transport capability. Military versions of the Islander usually have more advanced avionics, and four underwing hardpoints allow for a weapon load of over 1000 kg (2,205 lb).

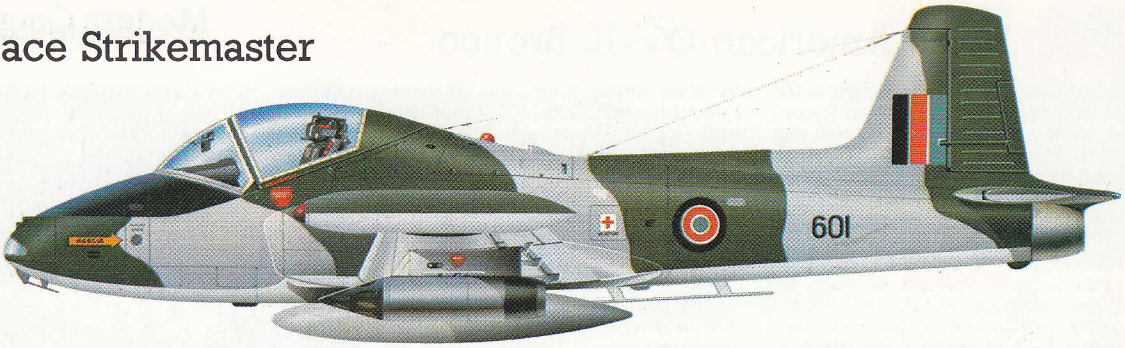


Right: Developed from the successful Islander light transport, the Pilatus Britten-Norman Defender is in service worldwide. Its short-field performance and simple maintenance make the Defender ideal for operations with the air arms of such forces as the Islamic Defence Force of Mauretania.

UK

British Aerospace Strikemaster

The **BAe Strikemaster Mk 80** light attack family traces its history to the Percival P.84 Jet Provost, the jet conversion of the Provost piston-engined trainer, flown on 26 June 1954 with the 744-kg (1,640-lb) thrust Armstrong Siddeley Viper engine. Delivery of the refined Jet Provost T.Mk 3 began in 1959 and this added 201 to the 12 of earlier marks, followed by 198 Jet Provost T.Mk 4s with the 1134-kg (2,500-lb) thrust Viper 201 and 110 Jet Provost T.Mk 5s with the side-by-side cockpit pressurized. Over 70 Jet Provosts were exported. The Strikemaster uses the same airframe but with reinforcement for the underwing load given in the specification, and with much special role equipment for operation in harsh climates from rough airstrips. The first flew on 26 October 1967, and its ability to provide effective close-support attack firepower at low cost resulted in wide sales, 146 being exported to Ecuador, Kenya, Kuwait, New Zealand, Oman, Saudi Arabia, Singapore, the South Arabian Federation and the Sudan. The last-named is one of those using **BAC.145** (**Strikemaster Mk 55**) aircraft, this being an interim machine with four instead of eight hardpoints and retaining the less powerful Viper 201 engine. The Strikemaster set a world record of repeat orders.



Above: Seen here in a Kenyan colour scheme, the Strikemaster serves with a large number of air forces including those of Ecuador, Kenya, Kuwait, Oman and the Sudan.

This Singapore Strikemaster is seen after releasing 250-kg (550-lb) bombs from some of the aircraft's eight underwing hardpoints. Eighteen-round Matra rocket launcher pods firing 68-mm unguided rockets are also carried.

Specification

British Aerospace Strikemaster Mk 80 series

Type: light close-support and weapon-training aircraft
Powerplant: one 1547-kg (3,410-lb) thrust Rolls-Royce Viper Mk 535 turbojet
Performance: maximum speed, clean at 9070 m (20,000 ft) 760 km/h (472 mph); radius with maximum weapons in a hi-lo-hi mission 400 km (250 miles), or with maximum fuel 1200 km (735 miles)
Weights: empty 2810 kg (6,195 lb); maximum take-off 5215 kg (11,500 lb)
Dimensions: span 11.23 m (36 ft 10 in); length 10.27 m (33 ft 8.5 in); height 3.34 m (10 ft 11.5); wing area 19.8 m^2 (213.7 sq ft)
Armament: eight hardpoints for 1361 kg (3,000 lb) of stores including all common bombs, rockets and launchers, retarded bombs, tanks and BAe/Vinten camera pod, plus two 7.62-mm (0.3-in) FN machine-guns, each with 550 rounds, in fuselage

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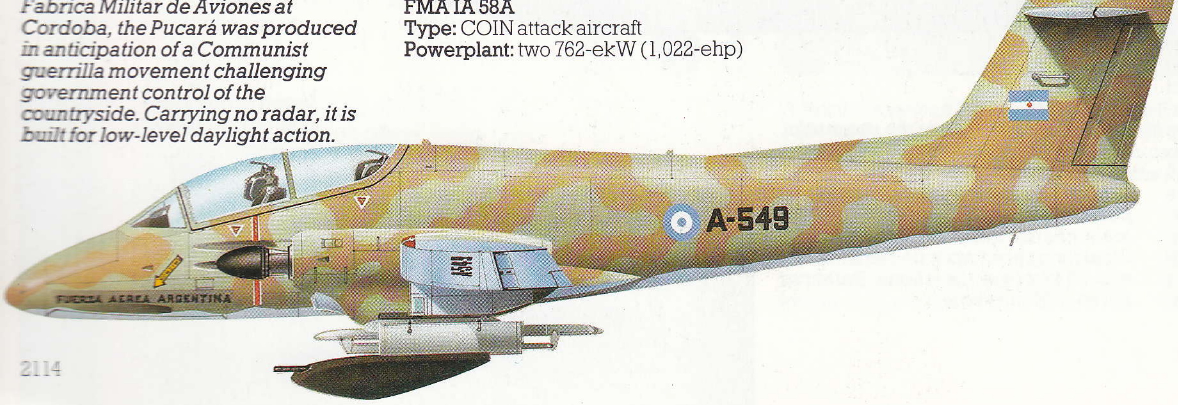
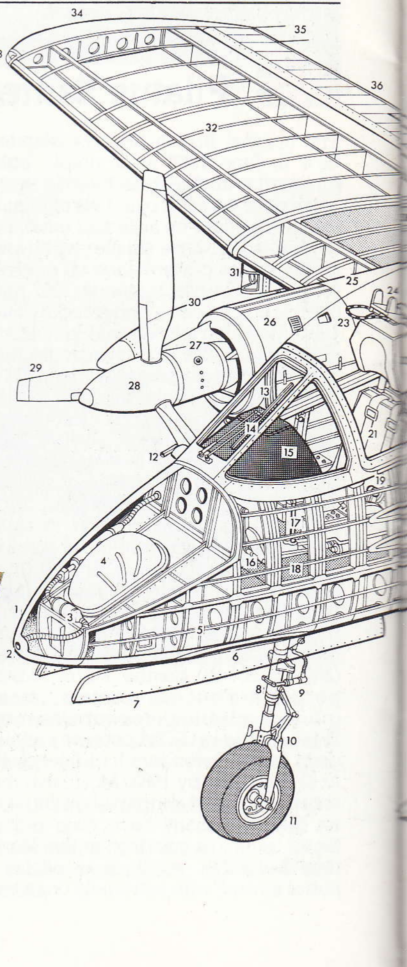
ARGENTINA

FMA IA 58A Pucará

The **FMA IA 58A Pucará** COIN (counter-insurgency) light attack aircraft stemmed from the intense US interest in such machines in the early 1960s, and design began in 1966. The first prototype flew on 20 August 1969, and after considerable development the first IA 58A production aircraft flew on 8 November 1974. About 100 had been delivered by 1983, six being sold to Uruguay. Features include French-supplied engines driving Hamilton Standard propellers, pilot and co-pilot in tandem Martin-Baker seats, good fuel capacity in fuselage and wing tanks, but only basic equipment for visual operation at low level by day or night. Radar is an option not fitted to Argentine aircraft, which were extremely active in the Falklands invasion where, with navy M.B.339s, they were the only combat type to operate from the islands. They were used against all surface targets and airborne helicopters, but not fewer than 23 were destroyed or captured, one being subsequently evaluated in the UK. The **IA 66** was flown in 1980 with Garrett TPE331 engines, and the **IA 58B Pucará Bravo** flew in 1979 with modified avionics and a longer and deeper nose housing two 30-mm DEFA 553 cannon, each with 140 rounds, replacing the 20-mm weapons. Tyre pressure is increased, though gross weight is unchanged. Production switched to the Bravo in 1982, output being about two per month. The **IA 58C Pucará** is a conversion of the IA 58A to single-seat configuration with two additional guns (30-mm DEFA cannon) plus improved avionics and weapons capability.

Designed and built at the Argentine Fabrica Militar de Aviones at Cordoba, the Pucará was produced in anticipation of a Communist guerrilla movement challenging government control of the countryside. Carrying no radar, it is built for low-level daylight action.

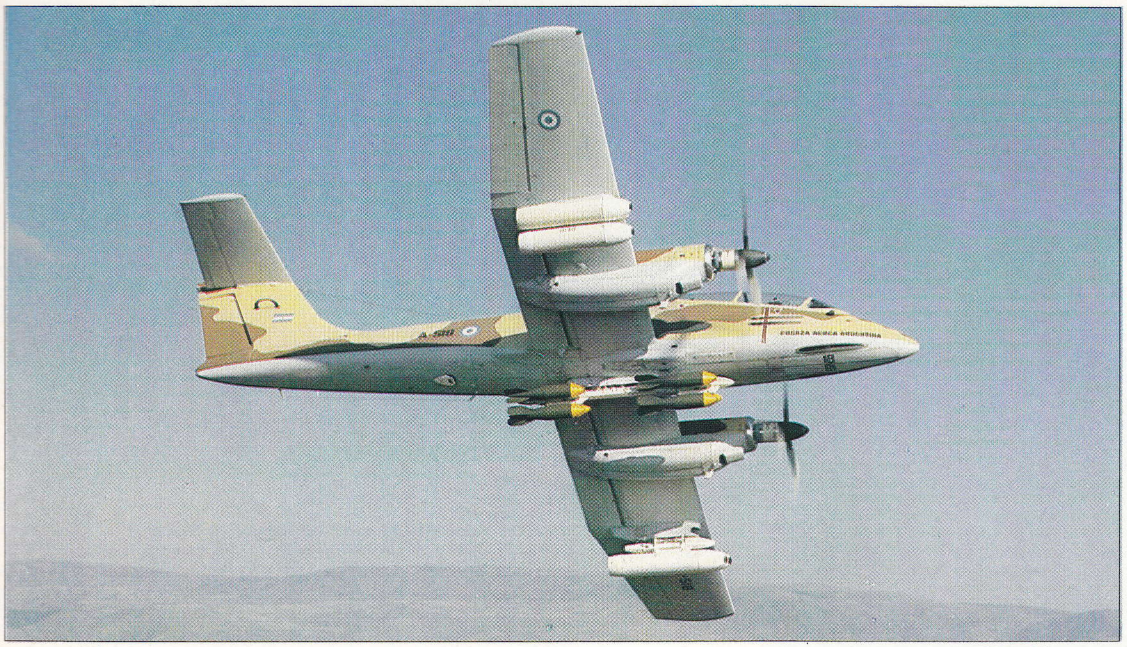




Specification

FMA IA 58A

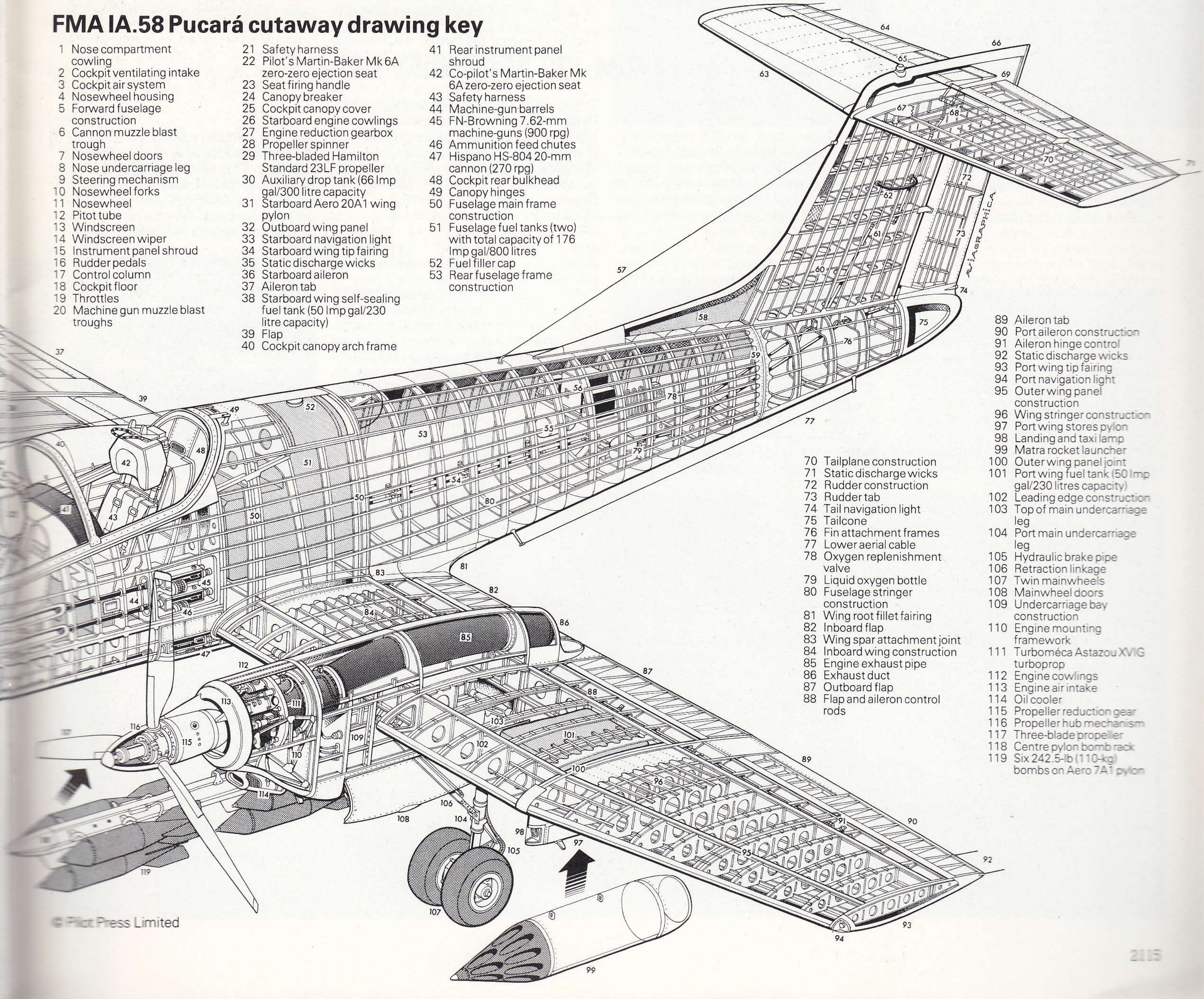
Type: COIN attack aircraft
Powerplant: two 762-ekW (1,022-ehp) Turboméca Astazou XVI G turboprops
Performance: maximum speed 500 km/h (311 mph) between sea level and 3650 m (11,975 ft); range with maximum fuel and no stores at 5000 m (16,405 ft) 3042 km (1,890 miles)
Weights: empty 4037 kg (8,900 lb); maximum take-off 6800 kg (14,991 lb)
Dimensions: span 14.5 m (47 ft 6.75 in); length 14.25 m (46 ft 9 in); height 5.36 m (17 ft 7 in); wing area 30.3 m^2 (326.1 sq ft)
Armament: two 20-mm Hispano HS 804 cannon, each with 270 rounds, and four 7.62-mm (0.3-in) FN-Browning machine-guns, each with 900 rounds, all in fuselage, plus a total of 1620 kg (3,571 lb) of external stores on three pylons, including one store of 1000 kg (2,205 lb)



A Pucará banks to reveal its bombload of six 125-kg (276-lb) general-purpose bombs which, together with its gun armament of two 20-mm Hispano cannon and four 7.62-mm (0.30-cal) machine-guns, make it a remarkably cost-effective weapons platform.

FMA IA.58 Pucará cutaway drawing key

1 Nose compartment cowling
2 Cockpit ventilating intake
3 Cockpit air system
4 Nosewheel housing
5 Forward fuselage construction
6 Cannon muzzle blast trough
7 Nosewheel doors
8 Nose undercarriage leg
9 Steering mechanism
10 Nosewheel forks
11 Nosewheel
12 Pitot tube
13 Windscreen
14 Windscreen wiper
15 Instrument panel shroud
16 Rudder pedals
17 Control column
18 Cockpit floor
19 Throttles
20 Machine gun muzzle blast troughs
21 Safety harness
22 Pilot's Martin-Baker Mk 6A zero-zero ejection seat
23 Seat firing handle
24 Canopy breaker
25 Cockpit canopy cover
26 Starboard engine cowlings
27 Engine reduction gearbox
28 Propeller spinner
29 Three-bladed Hamilton Standard 23LF propeller
30 Auxiliary drop tank (66 Imp gal/300 litre capacity
31 Starboard Aero 20A1 wing pylon
32 Outboard wing panel
33 Starboard navigation light
34 Starboard wing tip fairing
35 Static discharge wicks
36 Starboard aileron
37 Aileron tab
38 Starboard wing self-sealing fuel tank (50 Imp gal/230 litre capacity)
39 Flap
40 Cockpit canopy arch frame
41 Rear instrument panel shroud
42 Co-pilot's Martin-Baker Mk 6A zero-zero ejection seat
43 Safety harness
44 Machine-gun barrels
45 FN-Browning 7.62-mm machine-guns (900 rpg)
46 Ammunition feed chutes
47 Hispano HS-804 20-mm cannon (270 rpg)
48 Cockpit rear bulkhead
49 Canopy hinges
50 Fuselage main frame construction
51 Fuselage fuel tanks (two) with total capacity of 176 Imp gal/800 litres
52 Fuel filler cap
53 Rear fuselage frame construction
54 Tailplane control rods
55 Air bottle
56 Radio and electronics rack
57 VHF aerial cable
58 Fin root fairing
59 Tailcone stringer joint
60 Fin construction
61 Elevator control rod
62 VOR aerial
63 Starboard tailplane
64 Starboard elevator
65 Anti-collision light
66 Fin tip fairing
67 Tailplane attachment joint
68 Elevator hinge control
69 Elevator tabs
70 Tailplane construction
71 Static discharge wicks
72 Rudder construction
73 Rudder tab
74 Tail navigation light
75 Tailcone
76 Fin attachment frames
77 Lower aerial cable
78 Oxygen replenishment valve
79 Liquid oxygen bottle
80 Fuselage stringer construction
81 Wing root fillet fairing
82 Inboard flap
83 Wing spar attachment joint
84 Inboard wing construction
85 Engine exhaust pipe
86 Exhaust duct
87 Outboard flap
88 Flap and aileron control rods
89 Aileron tab
90 Port aileron construction
91 Aileron hinge control
92 Static discharge wicks
93 Port wing tip fairing
94 Port navigation light
95 Outer wing panel construction
96 Wing stringer construction
97 Port wing stores pylon
98 Landing and taxi lamp
99 Matra rocket launcher
100 Outer wing panel joint
101 Port wing fuel tank (50 Imp gal/230 litres capacity)
102 Leading edge construction
103 Top of main undercarriage leg
104 Port main undercarriage leg
105 Hydraulic brake pipe
106 Retraction linkage
107 Twin mainwheels
108 Mainwheel doors
109 Undercarriage bay construction
110 Engine mounting framework
111 Turboméca Astazou XVIG turboprop
112 Engine cowlings
113 Engine air intake
114 Oil cooler
115 Propeller reduction gear
116 Propeller hub mechanism
117 Three-blade propeller
118 Centre pylon bomb rack
119 Six 242.5-lb (110-kg) bombs on Aero 7A1 pylon



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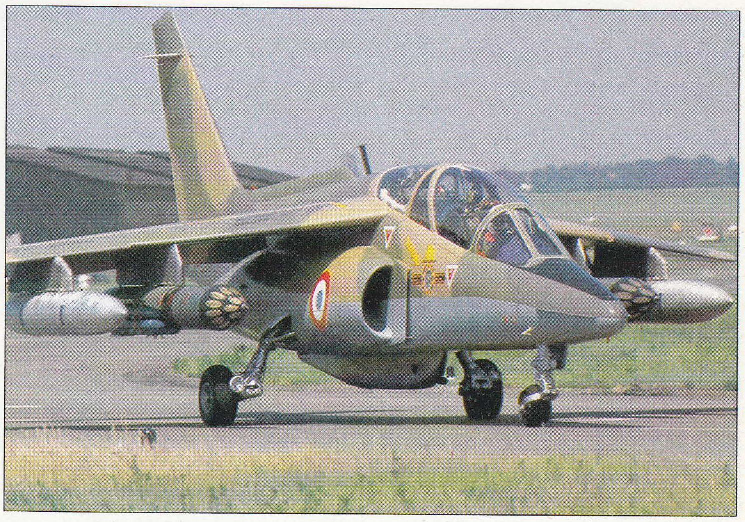
FRANCE/WEST GERMANY

Dassault-Breguet/Dornier Alpha Jet

Designed in the late 1960s to meet a joint Franco-German requirement for a jet trainer and light attack aircraft, the **Dassault-Breguet/Dornier Alpha Jet** was seriously delayed by the formation of a multi-national production programme for both the aircraft and its two small turbofan engines, so that though the prototype flew on 26 October 1973 the type did not enter service until five years later. The Alpha Jet has stepped tandem seats: advanced Mk 10 Martin-Baker ejector seats in the French and export models, but the MBB-built Stencel type in the Luftwaffe's aircraft which are used for close support and reconnaissance. The wing is mounted high, so the main landing gears retract into the fuselage into the underside of the inlet ducts. The two original partners bought 350, France having 175 of the **Alpha Jet E** (Ecole, or trainer) version, and West Germany 175 of the **Alpha Jet A** (Appui, or attack) model. Assembly lines in France have delivered 33 to Belgium, and small numbers to other customers, including Egypt, which set up its own assembly line for parts supplied from Europe. Belgium makes flaps and nosecones. The Dornier line supplied 12 ordered by Nigeria, total deliveries by 1983 accounting for almost all the 503 announced orders. Dornier is testing an Alpha Jet with a supercritical wing, and development was from 1982 centred on a more capable attack version, the **Alpha Jet NGEA**, which Egypt expects eventually to replace all its MiG-15s and MiG-17s. The Alpha Jet NGEA is distinguished by its extended nosecone with chisel (laser) tip.

An Alpha Jet, destined for the Force Aérienne Togolaise, is seen in French markings prior to delivery. More than 500 Alpha Jets have been built or are on order.



Specification

Dassault-Breguet/Dornier Alpha Jet E
Type: basic and advanced trainer
Powerplant: two 1350-kg (2,976-lb) thrust SNECMA/Turboméca Larzac 04-C5 turbofans
Performance: maximum speed clean at sea level 1000 km/h (621 mph); radius on a lo-lo mission with four 227-kg (500-lb) bombs 425 km (264 miles)
Weights: empty 3345 kg (7,374 lb); maximum take-off 7500 kg (16,535 lb)
Dimensions: span 9.11 m (29 ft 10.75 in); length 12.29 m (40 ft 3.75 in); height 4.19 m (13 ft 9 in); wing area 17.5 m^2 (188.4 sq ft)
Armament: provision for belly pod with 30-mm DEFA (Alpha Jet A 27-mm Mauser) cannon, plus maximum external load of 2500 kg (5,511 lb) on five stations including gun, bombs, rockets, missiles (Magic, Maverick), tanks, ECM pods or reconnaissance pod

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FRANCE

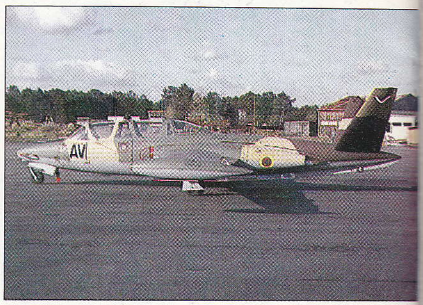
Aérospatiale (Air Fouga/Potez) CM.170 Magister

First flown in July 1952, the graceful **Fouga CM.170 Magister** was the first jet aircraft planned as a military basic trainer. Of all stressed-skin construction, the Magister sat extremely low on the ground and was noteworthy for its butterfly tail. Other unusual features included a wing of high aspect-ratio with glider-type airbrakes, pressurized tandem cockpits without ejection seats, and two extremely small turbojets in the wing roots with the nozzles on the sides of the rear fuselage. Trials showed excellent qualities and the French Armée de l'Air eventually purchased over 400, the first entering service in 1954. The Magister was adopted by the re-formed Luftwaffe and made under licence by a German group called Flugzeug-Union Süd; Valmet OY made Magisters in Finland, and together with French exports the total was 916. The Magister was also the aircraft chosen as the basis of Israel's aircraft industry, and many Israeli machines served in armed tactical attack roles, as did substantial numbers in various local wars, notably in Africa, Central America and Bangladesh. Six nations chose the Magister as a distinctive and fuel-efficient mount for their national aerobatic teams. The French Aéronavale used 30 hooked **CM.175 Zéphyr** aircraft for carrier training. So impressed with its Magisters has been Israel that it is rebuilding much of its fleet in the **AMIT** (Advanced Multi-mission Improved Trainer) programme with uprated engines, extended airframe life, and improvements in areas such as the hydraulics, avionics and cockpit layout.

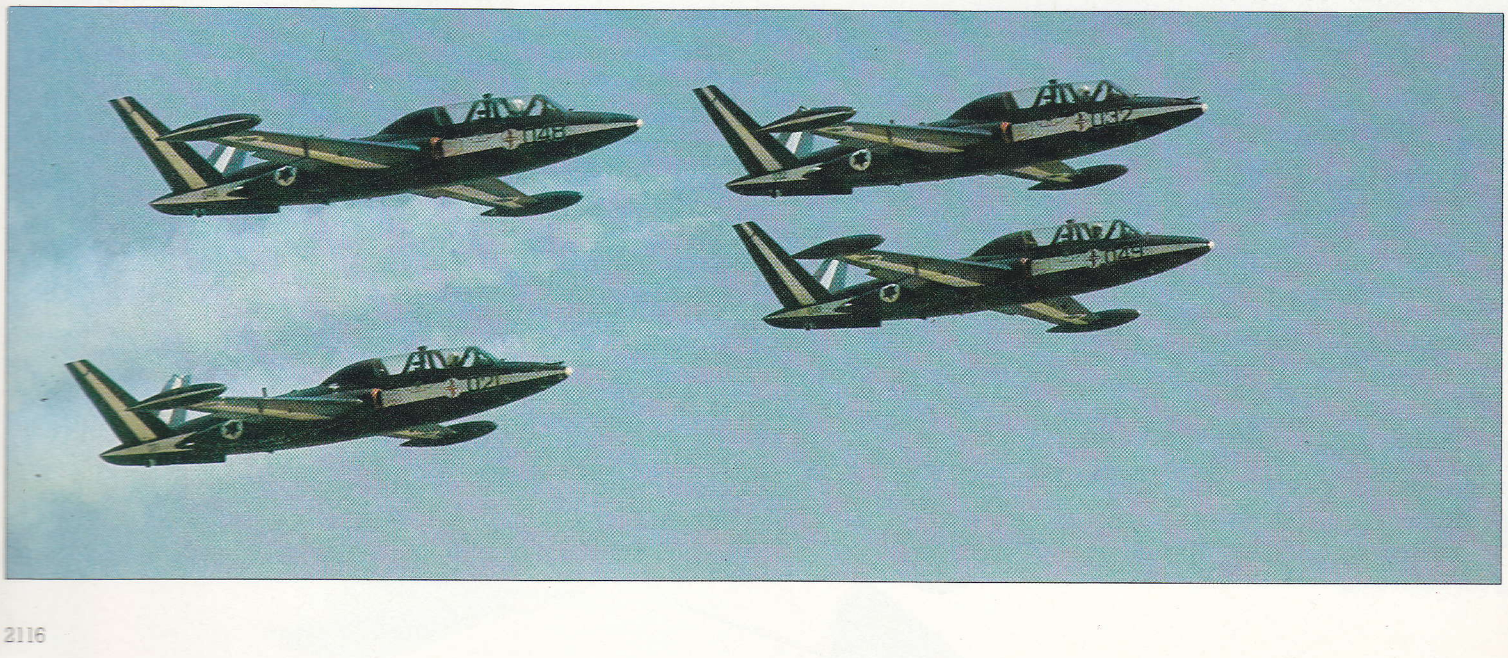
Specification

Aérospatiale (Potez Air Fouga) CM.170
Type: trainer and light attack aircraft
Powerplant: two 400-kg (882-lb) thrust Turboméca Marboré IIA turbojets
Performance: maximum speed 715 km/h (444 mph); range, clean at high altitude 925 km (575 miles)
Weights: empty 2150 kg (4,740 lb); maximum take-off 3200 kg (7,055 lb)
Dimensions: span (over tip tanks) 12.15 m (39 ft 10 in); length 10.06 m (33 ft 0 in); height 2.8 m (9 ft 2 in); wing area 17.3 m^2 (186.1 sq ft)
Armament: options include two nose machine-guns (7.5-, 7.62- or 12.7-mm/ 0.295-, 0.3- or 0.5-in); underwing light bombs, rocket rails or pod launchers or AS.11 wire-guided missiles

Magisters found ready homes with the defence forces of former French colonies. This aircraft is operated by the Armée de l'Air Cameroun, and while the much more modern Alpha Jet has also been introduced the cost-effective Magister remains in use.



Below: With almost 1,000 produced, the CM.170 Magister was one of the most widely used trainer/light attack aircraft of the 1950s and 1960s. It remains in service with Israel as a trainer with secondary operational capacity and as the mount for the IDF/AF formation flying team.

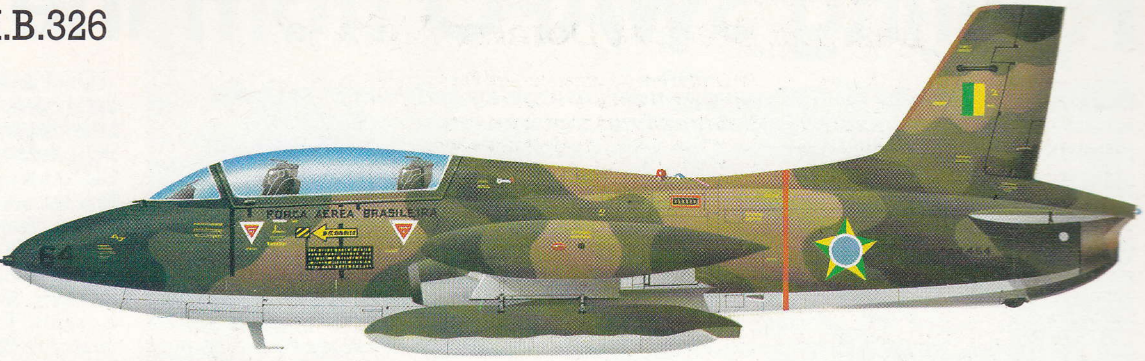


ITALY

Aermacchi M.B.326

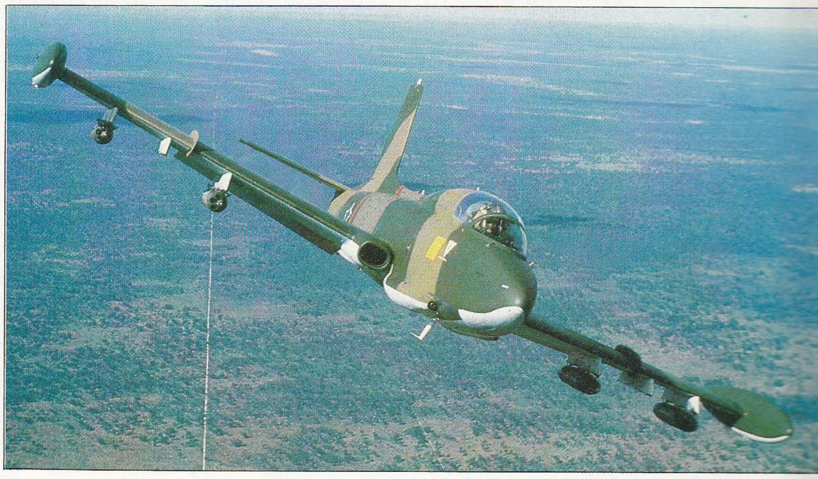
The prototype of the **Aermacchi M.B.326** jet trainer flew on 10 December 1957 and soon established a high reputation with a reliable 794-kg (1,750-lb) thrust Viper engine, tandem Martin-Baker seats and excellent performance and handling. Versions were sold all over the world, notably including South Africa where 40 were supplied from Italy and 111 armed versions made by Atlas, and Australia where 87 (RAAF) and 10 (RAN) were licence-built by CAC. Brazil was one of many to adopt the M.B.326GC made by EMBRAER as the AT-26 Xavante. Engine thrust increased to 1134 kg (2,500 lb) in early production versions and later to the figure in the specification below.

The powerful Viper 540 of 1524-kg (3,360-lb) thrust allowed weapon load to be doubled, and eventually Aermacchi produced a single-seat attack model, the **M.B.326K**, first flown on 22 August 1970. This has two heavy cannon in the fuselage and such add-ons as a laser ranger, bomb-delivery computer or reconnaissance pod. The M.B.326K has been sold to several air forces, and Atlas in South Africa continues producing a lower-powered (Mk 540 engine) version as the **Impala Mk II**. Aeritalia continued in 1982 producing the M.B.326L two-seater with the Mk 632 engine for export customers including Dubai and Tunisia.



Above: Manufactured in Brazil as the AT-26 Xavante, the Aermacchi M.B.326GC is a more powerful version of the original Italian design. Three AT-26 units have been designated full-time attack squadrons.

Specification
Aermacchi M.B.326K
Type: light attack, interception or reconnaissance aircraft
Powerplant: one 1814-kg (4,000-lb) Rolls-Royce Viper 632-43 turbojet built in Italy under RR/Fiat licence and assembled by Piaggio
Performance: maximum speed (clean) 890 km/h (553 mph) and (high altitude with weapons) 686 km/h (426 mph); combat radius (lo attack) 268 km (167 miles); ferry range with two tanks 2130 km (1,323 miles)
Weights: empty 3123 kg (6,885 lb); maximum take-off 5897 kg (13,000 lb)
Dimensions: span (over tanks) 10.86 m (35 ft 7 in); length 10.67 m (35 ft 0.25 in); height 3.72 m (12 ft 2 in); wing area 19.35 m^2 (208.3 sq ft)
Armament: two 30-mm DEFA 553 cannon each with 125 rounds, plus six underwing hardpoints for maximum of 1814 kg (4,000 lb) of stores including bombs, rockets, wire-guided ASMs, Magic AAMs, gun or camera pods or ECM



The Atlas Impala single-seat strike aircraft of the South African Defence Force is similar to the M.B.326K, from which it is derived. Used extensively in the bush war in Namibia, the Impala has proved useful in the regular small scale operations along the border.

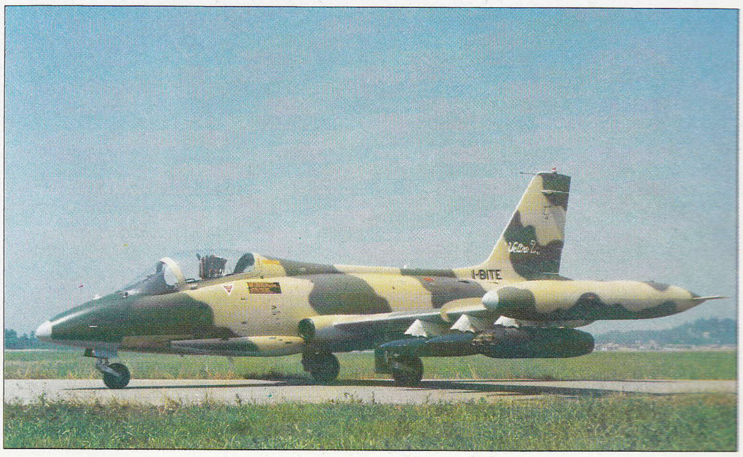
ITALY

Aermacchi M.B.339K

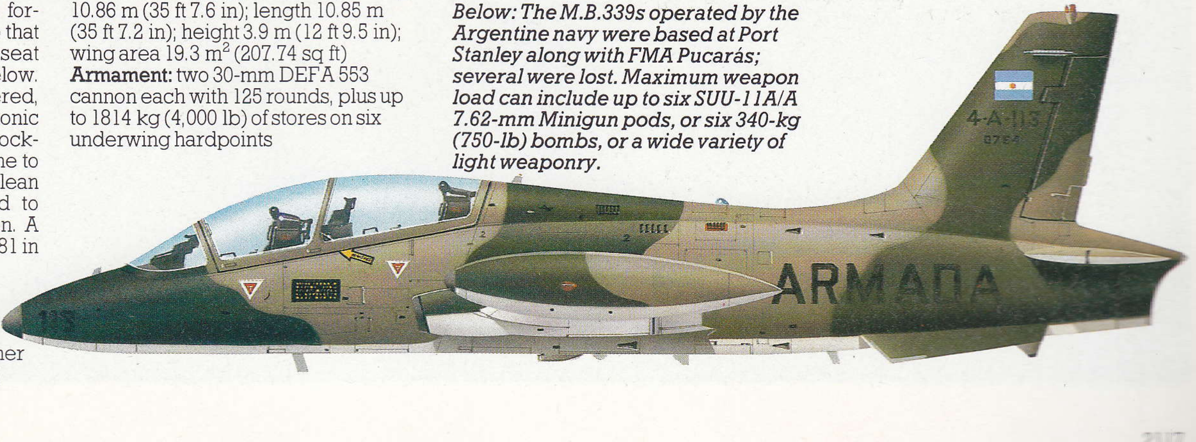
Following prolonged studies Aermacchi flew the prototype **Aermacchi M.B.339** second-generation trainer on 12 August 1976. The chief modification compared with the M.B.326 was the redesign of the tandem cockpits to give the instructor a good view ahead over the helmet of the pupil. Directional stability was maintained by a larger fin and canted ventral fins, and standard equipment included the Viper Mk 632 engine and Mk 10F zero/zero seats. The first of 100 M.B.339A trainers for the AMI was handed over on 8 August 1979 and major contracts have been fulfilled for the Argentine navy, Malaysia and Peru.

On 30 May 1980 the prototype **M.B.339K Veltro 2** (the original Veltro [Greyhound] was the wartime M.C.205V fighter) opened a very successful test programme for this company-funded attack version. The forward fuselage is broadly similar to that of the M.B.326K with a single-seat cockpit and two 30-mm guns below. Various customer options are offered, including numerous advanced avionic items, ECM systems, a HUD and cockpit TV display. Aermacchi has gone to particular care to demonstrate a clean structural limit of +8g/−4g and to avoid airframe fatigue or corrosion. A production batch was started in 1981 in advance of firm orders.

Specification
Aermacchi M.B.339K
Type: light attack and weapon trainer
Powerplant: one 1814-kg (4,000-lb) thrust Rolls-Royce Viper Mk 632-43 turbojet made in Italy under RR/Fiat licence and assembled by Piaggio
Performance: maximum speed at sea level (clean but with full gun ammunition) 899 km/h (558 mph); combat radius (with guns and four Mk 82 bombs, total 1088 kg/2,400 lb) 376 km (234 miles)
Weights: empty equipped 3174 kg (6,997 lb); maximum take-off 6150 kg (13,558 lb)
Dimensions: span (standard tiptanks) 10.86 m (35 ft 7.6 in); length 10.85 m (35 ft 7.2 in); height 3.9 m (12 ft 9.5 in); wing area 19.3 m^2 (207.74 sq ft)
Armament: two 30-mm DEFA 553 cannon each with 125 rounds, plus up to 1814 kg (4,000 lb) of stores on six underwing hardpoints



Named after the World War II fighter, the M.B.339K Veltro 2 is a single-seat version of the M.B.339 trainer. Armament capacity remains similar, but a major difference is the fitting of two DEFA 30-mm cannon internally in the lower forward fuselage.



Below: The M.B.339s operated by the Argentine navy were based at Port Stanley along with FMA Pucarás; several were lost. Maximum weapon load can include up to six SUU-11A/A 7.62-mm Minigun pods, or six 340-kg (750-lb) bombs, or a wide variety of light weaponry.

Fighting SWAPO from the air

Arguably amongst the most effective counter-insurgency and counter-terrorist forces in the world, South Africa has long been involved in and controlled the neighbouring territory of Namibia. One of the factors allowing this in the face of critical world pressure is a most effective use of air superiority.

By their nature, guerrilla wars tend to be protracted affairs. Having the attacker's privilege of choosing the time and place for his move, the guerrilla can operate with economy of effort and equipment, whilst the invariably more sophisticated subject of his attentions is obliged to tie down large forces in anticipation of attack. For this reason, governments faced with insurgency or internal irregular armies must attempt to employ the most cost-effective and subtle means of neutralizing the opponent. To the guerrilla, bankrupting the government and alienating its supporters through a long and costly war is just as effective a means of gaining power (and probably less risky) as storming the presidential palace.

Airspace control

The beleaguered government will normally mount ground operations against the insurgent with the backing of airborne forces, and when it is in control of airspace above the combat zone, these will include helicopters and relatively cheap and manoeuvrable COIN aircraft. Able to operate from small, perhaps hastily prepared airstrips close to the action, the COIN force will be able to respond with some of the speed which is a prime weapon of the guerrilla in the evasion of his pursuers. Good intelligence, well-planned combined forces operations and a high quality of airmanship (plus great patience) can often seriously hamper the guerrilla, but in some cases the campaign is even more complex.

Division of the world into power blocs has meant that irregular forces are normally able to secure the backing of one 'side' if the government to be attacked is a member of an opposing alliance. Furthermore, the guerrilla may be fortunate in gaining the support of a country bordering that in which he is operating, providing a comparatively safe haven from which to launch his forays. This complicates the political position considerably. The victim of guerrilla action, or his supporters, is also faced with the dilemma of the level of force to be used if he elects to raid base camps in the neighbouring nation. Even at home, the degree by which COIN aircraft should be backed by more powerful equipment must be carefully thought out: armadas of giant Boeing B-52s carpet-bombing the Vietnamese jungle were an impressive sight, but their effect was limited and very bad for public relations.

Add a United Nations-imposed embargo on the supply of military equipment to the government in question, and an impression is gained of the present situation in southern Africa. The white-ruled Republic of South Africa has illegally administered Namibia since 1966 in defiance of UN Resolution 435, using it as a buffer against the spread of revolution from Angola farther to the north. With strong Soviet and Cuban support, Angola until 1984 aided SWAPO (South West Africa People's Organization) guerrillas in their infiltration of Namibia, whilst as a counter, Western-orientated UNITA guerrillas are active against the Marxist regime in Angola, until recently aided by South Africa.

On the premise that attack is better than defence, South Africa regularly used COIN and more sophisticated aircraft to pre-empt SWAPO offensives by driving deep into Angola. Operations 'Moscow' (March 1978), 'Smokeshell' (June 1980), 'Protea' (June 1981), 'Daisy' (November 1981) and 'Askea' (December 1983) all involved combined air and ground thrusts from Namibia well into Angolan territory, 320 km (200 miles) in the case of some air raids. These, and the need to retain 60 per cent of its strength in Angola to combat UNITA, have weakened SWAPO, yet the organization is still able to infiltrate central Ovamboland to mine roads, to bomb busy shops and supermarkets, and to carry out 'armed propaganda'.

M.B.326 conversion

In these expeditions by the SAAF into Angola, Dassault-Breguet Mirage F.1s, BAC Canberra B(I).Mk 12s and HS Buccaneer S.Mk 50s have been the prime attack weapons, supported closer to the front line by Aermacchi M.B.326K Impala Mk IIs. Built locally by Atlas Aircraft, the single-seat attack-optimized Impala Mk II is a follow-on to the two-seat M.B.326M Impala Mk I trainer, which is also used in large numbers by the SAAF. Six squadrons, shortly to be consolidated into four, fly one or both marks of Impala in the COIN role.

When not involved in a major mission, the Impala squadrons undertake twice-yearly rotations to 'up country' airstrips (near the operational area) from which they undertake close

Mainstay of the close support operations in the bush, the Atlas Impala is the aircraft called when a patrol runs an individual SWAPO man to earth. Rather than take risks, the patrol commander will often have the whole area strafed or napalmed (unless of course the fugitive surrenders).

Above: The Atlas C4M Kudu is used in the bush for light transport duties as well as forward air control, and can carry light armament. Atlas insist that it is an indigenous design, although the resemblance to the Aermacchi AM.3CM (also flown by the SADF) is striking.

air support and reconnaissance sorties. Secondary roles are night attack, SAR helicopter escort, landing zone defence suppression and artillery communications link. Armament typically comprises four six-rocket pods or two 18-rocket pods, 150 30-mm rounds for each of two DEFA cannon, and a camera pod, but in certain cases a bombload of six 120-kg (265-lb) or four 250-kg (551-lb) weapons is carried.

Regular searches for SWAPO insurgents carry little danger for Impala units, but sorties into Angola have been less safe. This fact is appreciated fully by the pilot of one Impala participating in Operation 'Askea' who returned safely to base with the unexploded warhead of a Soviet-made SA-8 'Gecko' SAM lodged in his jetpipe. The SAM danger, particularly from weapons such as the widely used shoulder-launched SA-7 'Grail', forces the Impalas to fly at tree-top height in danger areas.

Vulnerable helicopters

All-important helicopters providing troop mobility are additionally vulnerable to small arms fire, as was proved in August 1982 when an Aérospatiale Puma was shot down by SWAPO, killing 15 troops and crew. The Puma is the main mobility helicopter, and is aided by the heavier Aérospatiale Super Frelon, which is capable of carrying a small armoured car in its hold. Smaller Aérospatiale Alouette IIIs may also be fitted with guns or other forms of light armament for escort and defence suppression missions. Fixed-wing reconnaissance, liaison and observation, with the additional ability to carry light armament on four underwing pylons, is undertaken by Atlas/Aermacchi AM.3CM Bosboks, backed up by basically similar Atlas C4M Kudus. It is the light aircraft and helicopters which support the regular search operations in the Angolan border area and deal at close quarters with any guerrilla bands thus flushed out.

With these assets, the SAAF will continue the air war against SWAPO and its supporters. As in the case of many similar COIN conflicts, wise use of air power can go a long way towards thwarting the guerrilla, but is unlikely to deliver a permanent solution. That will have to be achieved by political means.

Above: South African pilots are very highly trained, to a standard unlikely to be matched by any northern neighbours. When SADF pilots are told to fly low, they fly very low indeed – a practice which cuts enemy reaction time in an attack on a SWAPO post.

Operating close behind the front line, Impalas can be on the scene of an incident more quickly than more sophisticated aircraft, tied as they are to their elaborate base facilities. As is usual in these operations, rockets in six- or 18-round pods are a favoured weapon.

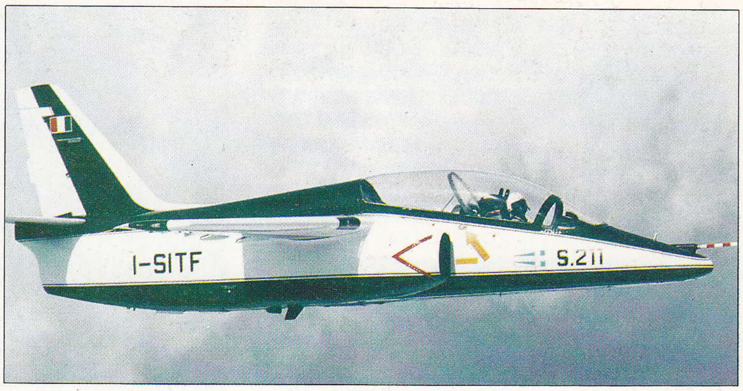
ITALY

SIAI-Marchetti S.211

Typical of the current trend towards providing advanced, basic and even primary trainers with light armament capability, the **SIAI-Marchetti S.211** is a logical step up from the manufacturer's SF.260 series. The wing has four hardpoints to enable the S.211 to be used in the COIN role with a total of 600 kg (1,323 lb) of external ordnance (or fuel tanks or reconnaissance pods). Optional avionics for attack missions include Doppler radar, a nose-mounted radar ranger, and a head-up display.

A prototype S.211 first flew on 10 April 1981, to be followed by a further pair of trial aircraft by early 1983. Orders and options for 90 by four customers were being claimed at that time, the first placed in July 1982 by Singapore for 10 plus 20 options. Production aircraft made their initial flights from 4 October 1984 onwards, and six of these have been delivered complete from Italy, the other four following in kit form for assembly by Singapore Aircraft Industries, which will produce the batch of 20. A 1983 order for four by the Haiti Aviation Corps represented the first jet equipment for this small air arm, whilst six are reportedly in prospect for Somalia.

Combining economy and efficiency in the design, SIAI opted for low gross weight, low fuel consumption, an advanced-concept wing and incorporation of new technology to reduce cost and maintenance requirements. Fuel economy is provided by the single Pratt & Whitney Canada JT15D-4C twin-spool turbofan, with a high bypass ratio of 2.7:1 and specific fuel consumption of 15.92 mg/Ns (0.562 lb/h/lb thrust), about half that of a pure turbojet, and more than 20 per cent better than many modern turbofans. The aircraft's high-technology wings are of supercritical section, designed by computer with help from two US universities and tested in Boeing's transonic wind tunnel on a 20 per cent scale model. Compared with traditional laminar aerofoils, the wings have a higher relative thickness which means easier construction and more space for fuel.



The SIAI-Marchetti S.211 has been designed as a lightweight, low-cost basic trainer but with a secondary attack capability, as is often required today. Weapon load could include four Matra multiple rocket-launchers, or bombs or gun pods.

Specification

SIAI-Marchetti S.211

Type: basic jet trainer and COIN aircraft

Powerplant: one 1134-kg (2,500-lb) thrust Pratt & Whitney Canada JT15D-4C non-afterburning turbofan

Performance: maximum cruising speed 667 km/h (414 mph); initial climb rate 1280 m (4,200 ft) per minute; service ceiling 12200 m (40,025 ft); endurance 3 hours 50 minutes with 30-minute reserves

Weights: empty 1615 kg (3,560 lb); maximum take-off 3100 kg (6,834 lb) armed, or 2500 kg (5,511 lb) as trainer

Dimensions: span 8.43 m (27 ft 8 in); length 9.31 m (30 ft 6.5 in); height 3.80 m (12 ft 5.5 in); wing area 12.60 m^2 (135.6 sq ft)

Armament: light bombs, rocket and machine-gun pods, grenade launchers or reconnaissance pods up to total of 600 kg (1,323 lb)

ITALY

SIAI-Marchetti SF.260

Designed by Stelio Frati for the Aviamilano company, the **SF.260** first flew in 1964 as a civil two/three-seat light aircraft for fully aerobatic use. Subsequently it was developed by the SIAI-Marchetti company for many roles including civil and military training, including night, navigation and formation instruction, and in two role-equipped forms, the **SF.260W Warrior** and **SF.260SW Sea Warrior**. Only one Sea Warrior was built, as a surveillance/SAR (search and rescue)/supply aircraft, but the Warrior has sold to air forces and paramilitary customers all over the world. By late 1984 total sales of all SF.260 versions had exceeded 800. The basic SF.260 is an all-metal fighter-like machine with retractable tricycle landing gear and an enclosed cockpit seating pupil and instructor side-by-side with a third seat central at the rear. All fuel is in the wings or the fixed wingtip tanks, and there is an extremely wide choice of avionics, equipment and, in the SF.260W models, of weapons. The military **SF.260M** aerobatic trainer has been sold to Italy, Belgium, Bolivia, Burma, Ecuador, Libya (160 of whose were assembled in that country), Morocco, Philippines, Singapore, Thailand, Tunisia, Zaîre and Zambia. Zimbabwe's air force uses the **SF.260C**. The SF.260W Warrior is used with various role kits by Burma, Comores, Dubai, Eire, Philippines, Tunisia, Zimbabwe and three other countries. In July 1980 the manufacturer flew the first **SF.260TP** with an Allison turboprop, and this version is available as an alternative to the older piston-engined models, the 261-kW (350-shp) output of the Allison 250 offering useful benefits in the performance/payload mix.

Specification

SIAI-Marchetti SF.260W

Type: multi-role trainer and close-support aircraft

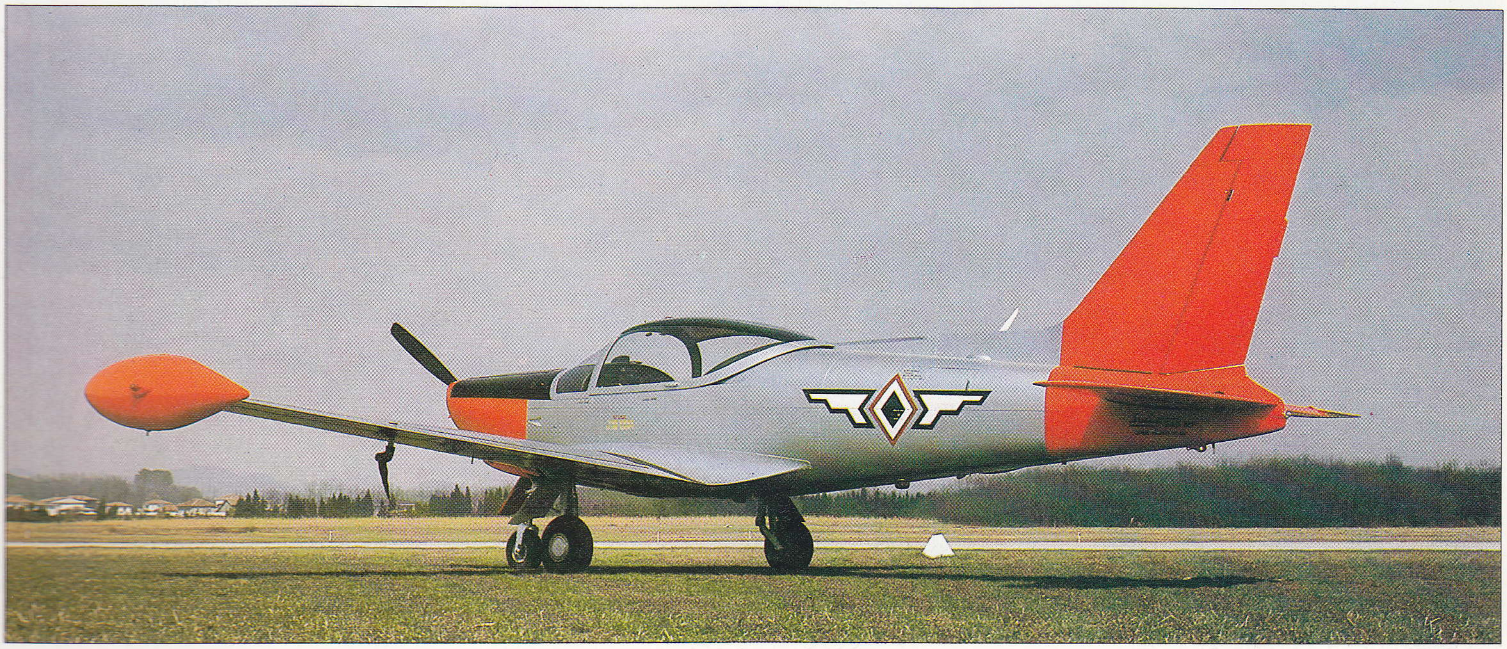
Powerplant: one 194-kw (260-hp) Avco Lycoming O-540-E4A5 piston engine

Performance: maximum speed 305 km/h (190 mph); mission radius on a 4 hour 54 minute strike mission with 5 minutes over target and a 20-kg (44-lb) reserve 556 km (345 miles)

Weights: empty 770 kg (1,697 lb); maximum take-off 1300 kg (2,866 lb)

Dimensions: span (over tanks) 8.35 m (27 ft 4.75 in); length 7.1 m (23 ft 3.5 in); height 2.41 m (7 ft 11 in); wing area 10.1 m^2 (108.7 sq ft)

Armament: up to 300 kg (661 lb) on four underwing pylons (when flown solo) including up to four 7.62-mm (0.3-in) gun pods, any of seven types of rocket launcher, various bombs, reconnaissance or ECM pods or tanks

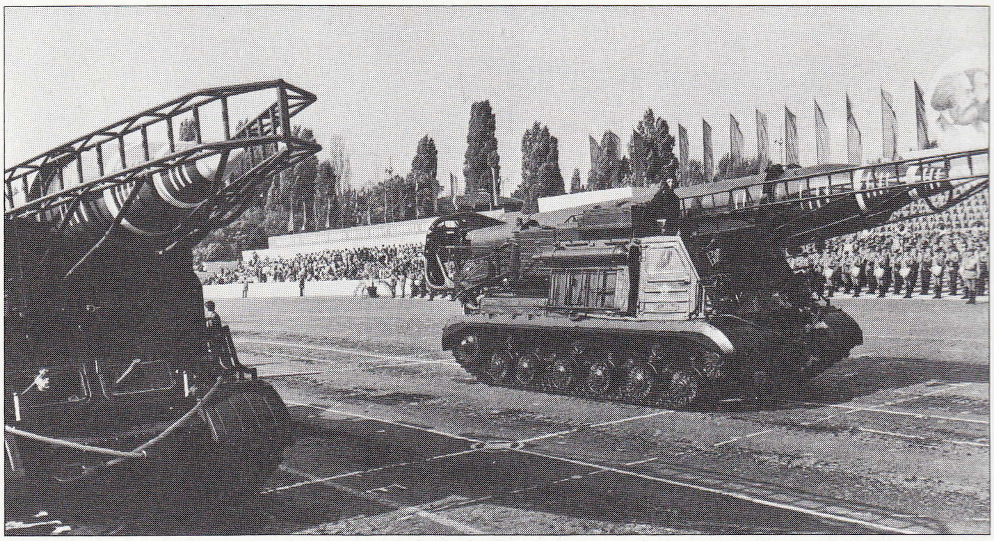


The SIAI-Marchetti SF.260M is a basic military trainer operated by a number of air forces, including that of the Philippines. The PAF use both the trainer variant and the dedicated attack version, the Warrior. This equips a single squadron at Zamboanga, which operates against the guerrillas of the Mindanao National Front.

Warsaw Pact

Part 4

Romania



The Romanian army has two SSM brigades equipped with SS-1 'Scud' missiles, seen here mounted on a converted JSIII tank chassis. Under the maverick President Ceausescu Romania has refused to allow other Warsaw Pact forces into the country, but the Soviets still supply their latest weaponry, for example the T-72 MBT.

Like a number of other European countries, Romania sided with Germany during World War II and Romanian troops took part in the invasion of the Soviet Union in 1941. In the early campaigns they acquitted themselves quite well, but then suffered heavy losses during the Battle of Stalingrad, which was the turning point on the Eastern Front. By mid-1944 the Soviets were ready to take Romania, but the king succeeded in overthrowing the military dictatorship and Romania then signed an armistice with the USSR allowing Soviet forces to remain on Romanian soil until a formal peace treaty was signed. From then on the Soviets strengthened their position in the country, and in 1947 the king was forced to abdicate to avoid a civil war. Today Romania is a member of the Warsaw Pact, although its forces rarely take part in joint exercises and the country does not allow Warsaw Pact troops even to cross its borders.

The Romanian armed forces have a total strength of 190,000 officers and men, of whom 109,000 are conscripts. In the army and air force conscripts serve 16 months, while in the navy they serve 30 months. Total reserves for all three arms total about 565,000, some 500,000 of them for the army.

The army has two tank divisions (both in the south east of the country), eight motorized rifle divisions, three mountain brigades, one airborne brigade, two 'Scud' surface-to-surface missile brigades, two artillery brigades, three anti-aircraft brigades, three artillery regiments, one anti-aircraft regiment and five anti-tank regiments.

Equipment in service includes 50 or more T-72 MBTs, 200 or more M77 MBTs, 1,000 T-54/T-55 MBTs and a few T-62 MBTs, plus quantities of T-34/85 tanks in reserve or used for training. Other armoured vehicles include 400 BRDM-1 and BRDM-2 4×4 amphibious scout cars, and 2,700 armoured personnel carriers including BTR-50, BTR-60, BTR-152, OT-62 and TAB-72 series vehicles, the last being a Romanian-built version of the Soviet BTR-60PB. Self-propelled artillery includes 200 SU-100s and some SU-76s, which are both now probably only used for training. Anti-tank weapons include recoilless rifles, 'Snapper' and 'Sagger' ATGWs, and 57-mm and 76-mm anti-tank guns. About 1,000 towed guns are available, including the 76-mm (3-in) M48 mountain gun (from Yugoslavia), 85-mm (3.35-in) D48, 85-mm D44, 100-mm (3.9-in) M1944, 122-mm (4.8-in) D-30, 122-mm M1931/37, 122-mm M1938, 152-mm (6-in) D-20, 152-mm M1937 and 152-mm M1938 weapons, and some coastal artillery. There are about 150 multiple rocket-launchers including the 122-mm and 130-mm (5.1-in) types. Surface-to-surface missile launchers include 20 'Scud' and 30 'FROG-7' units. About 500 towed anti-aircraft guns are available, including 14.5-mm ZPU-2, 30-mm M53, 37-mm M1939, 57-mm S-60, 85-mm KS-12 and 100-mm KS-19 types. A few 23-mm ZSU-23-4 self-propelled anti-aircraft guns are in service, plus some SA-6 'Gainful' and SA-7 'Grail' surface-to-air missiles.

In addition to building the TAB series of 8×8 armoured personnel carriers, Romania also builds its own version of the T-54/T-55 called the M77, and this has been exported to Egypt.

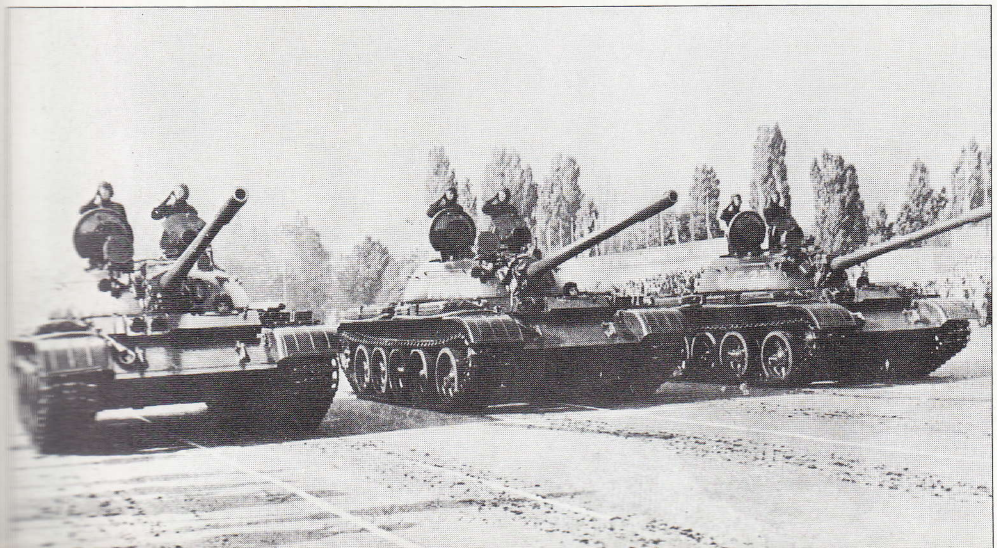
Romanian Navy

The Romanian navy has a total strength of 7,500 officers and men, of whom 3,500 are conscripts. In addition to sea-going activities, the navy is also responsible for coastal defences with 130-mm guns, and has an air element with six Mi-14 'Haze' ASW helicopters and the Danube squadron. Two 4,500-ton destroyers were launched in 1982 and should soon join the fleet. Other ships include three 'Tetal' class frigates, three 'Poti' class corvettes, three 'Kronshtadt' class large patrol craft, 19 'Shanghai' class fast attack craft (the first three from China and remainder built in Romania), 21 'Huchuan' fast attack craft (the first three from China and the remainder built in Romania), six 'Osa I' fast attack craft, 14 'Epitrop' class fast attack craft, 40 river patrol craft, one mine warfare support ship, four 'M 40' class coastal minesweepers and eight 'TR 40' class minesweepers, plus the usual support ships, tugs, training and survey craft.

Romanian Air Force

The Romanian air force has a total strength of 32,000 officers and men, of whom 10,000 are conscripts, with about 320 combat aircraft. There are six fighter/ground-attack squadrons with 70 Mikoyan-Gurevich MiG-17s, which are to be replaced by the locally-built IAR-93A (20 ordered) and IAR-93B (165 ordered). The IAR-93 is a joint development between Romania and Yugoslavia, the latter calling it the Orao. There are 12 air-defence squadrons, 11 of them with some 200 MiG-21s and one with 24 MiG-23s. The single reconnaissance squadron has 18 Ilyushin Il-28s. There is one transport regiment with three Il-14, 10 Antonov An-24, four Il-18, one Il-62, six An-26, five Il-2 and one Boeing 707 aircraft. There is one helicopter regiment with 10 Mil Mi-4, 25 Mi-8, 50 or more IAR-316B (licence-built Aérospatiale Alouette III) and 30 or more IAR-330 (licence-built Aérospatiale Puma) helicopters. Trainers include 50 MiG-15UTIs, 50 Aero L-29s and a number of Yakovlev Yak-52s, a type built in Romania for both the home and export markets. The air force also controls an air-defence division with 108 launchers for SA-2 'Guidelines' at 20 sites.

Romanian para-military forces include 37,000 border guards (of whom perhaps 17,000 are conscripts), 20,000 Ministry of Defence security troops, and 900,000 Patriotic Guards.



Romania's two tank and eight motor rifle divisions still rely on the ageing T-55; only a few T-72s have so far been delivered. Some of the T-55s have been locally modified under the designation M-77 and are fitted with side skirts, a sixth road wheel and, apparently, improved engine cooling.

Hungary

12 PASS

Like all members of the Warsaw Pact, Hungary uses mainly Soviet equipment but does produce its own family of APCs and reconnaissance vehicles. The FUG is a 7-tonne, six-man scout car of welded steel construction. It has been exported to Poland and Czechoslovakia.

Before the outbreak of World War II Hungary supported Germany, and in 1941 provided troops for the Axis invasion of Yugoslavia and, following the German invasion of the Soviet Union in the same year, provided troops and aircraft for service on the Eastern Front. In 1944 the Germans were pushed out of Hungary by Soviet forces and the Hungarian army disintegrated. After the end of the war a coalition government was formed with less than 20 per cent of the population voting for the Communists. The latter, however, controlled the Ministry of the Interior and therefore the police, and were also backed by the Soviet occupation forces. In 1956 there was an uprising in Hungary which was soon put down by Soviet troops and its leaders taken to Moscow where they were later executed. Since then the country has become more settled and relaxed than in the early 1950s, and much economic progress has been made.

Hungary is the home of the Soviet Southern Group of Forces with its headquarters in Budapest, and this controls two tank divisions (the 2nd and 5th) and two motorized rifle divisions (the 35th and 102nd).

The Hungarian armed forces total about 105,000 officers and men, of whom 58,000 are conscripts. The latter serve 18 months in the army or border guard and 24 months in the air force. Reserves for all forces total just under 150,000.

Hungarian Army

The Hungarian army has a total strength of 84,000 officers and men, of whom 58,000 are conscripts. The army has five motorized rifle divisions (the 4th, 9th, 12th, 17th and 27th), one tank division (the 5th), one artillery brigade, one surface-to-surface missile brigade with 'Scud' missiles, one anti-aircraft artillery brigade with four regiments (one with SA-4 'Ganef' and three with SA-6 'Gainful' surface-to-air missiles). There is also a single airborne battalion. The army also controls the Danube flotilla, which has a strength of about 500 officers and men and operates 40 assorted riverine craft including 10 river patrol boats each armed with a single heavy machine-gun.

Equipment in service includes 1,200 T-54/T-55 MBTs, a number of older T-34/85 tanks (used for training), 100 or more T-72 MBTs, 100 PT-76 light tanks, 1,500 APCs and MICVs including the BMP-1, MT-LB, OT-64 8×8 and PSzH-IV types, and reconnaissance vehicles including some 500 BRDM-2s and FUGs. Artillery includes 200 122-mm (4.8-in) D-30 and M1938 towed howitzers, 50 or more 122-mm 2S1 self-propelled howitzers, 50 152-mm (6-in) D-20 towed howitzers, 100 152-mm M1943 towed howitzers, a few 152-mm 2S3 self-propelled howitzers, and 50 to 100 122-mm BM-21 and 240-mm (9.45-in) BM-24 multiple rocket-systems. Surface-to-surface launchers include nine for the 'Scud' and 24 for the FROG-7. Anti-tank weapons include BRDM-2s with the 'Sagger' ATGW, AT-4 'Spigot' man-portable ATGWs, recoilless rifles and 140 85-mm (3.35-in) D44 and 100-mm (3.9-in) T-12 anti-tank guns.

Air-defence weapons include 100 57-mm S-60 and 100-mm KS-19 towed anti-aircraft guns, small-calibre anti-aircraft guns such as the ZPUs, 100 23-mm ZSU-23-4 and 57-mm ZSU-57-2 self-propelled anti-aircraft guns, SA-7 'Grail' man-portable SAMs, and SA-4 'Ganef', SA-6 'Gainful' and SA-9 'Gaskin' SAMs.

Hungarian Air Force

The Hungarian air force has a total strength of 21,000 officers and men, of whom 8,000 are conscripts. There are nine air-defence squadrons with 120 Mikoyan-Gurevich MiG-21s and 25 MiG-23s; two transport squadrons with 24 Ilyushin Il-14, and Antonov An-2, An-24 and An-26 aircraft; and three helicopter squadrons. The last have 30 Mil Mi-8 and 24 Mi-24 plus 20 Kamov Ka-26 helicopters. Training aircraft include MiG-15s and the Aero L-29. The air force also controls an air-defence division with 20 sites, each having six launchers for the SA-2 'Guideline' or SA-3 'Goa' surface-to-air missile.

Para-military forces include 15,000 border guards, of whom 11,000 are conscripts, and a workers' militia of 60,000.

An FUG radiological-chemical vehicle exits the water carrying lane-marking gear on the back of the hull. Similar in concept to the Soviet BRDM-1 rkh, this FUG drives through contaminated areas marking lanes with poles dispensed from the rack at the back.